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THE

LARYNGOSCOPE.

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

HARE-LIP AND CLEFT PALATE.*

DR. M. N. FEDERSPIEL, Milwaukee, Wis.

In the human mouth at the entrance are two fleshy folds, the lips, covered externally by the skin, and internally by the mucous membrane.

In the middle part of the outer surface of the upper lip is a vertical depression, groove-like in appearance, called the philtrum. The inside of the upper and lower lip in the middle line joins the gum tissue of the corresponding jaw by a fold of mucous membrane called the frenum. The covering of the margin of the lips is mucous membrane, which is thicker and drier than that of the oral cavity called the vermillion border, which is well defined.

In the middle line of the border of the upper lip and at the lower end of the philtrum is a slight elevation, the labial tubercle. On each side of the labial tubercle the vermillion line points upward, and then gently curves downward to the angle of the mouth. In the lower lip the vermillion border is greater in the middle line from which it curves gently upward to the angle of the mouth.

In a healthy person, the vermillion border of the lips are of a bright red color and lightly wrinkled. The thickness varies in individuals. This is also true of the amount of redness exposed.

The formation of the upper lip is brought about by the union of the maxillary globular and frontonasal processes in embryo. Should these processes fail to unite the result is a defect called *Hare-Lip*.

*Read before the joint meeting of the Oral Surgery Section of the First District Dental Society of New York, and the Nose and Throat Section of the New York Academy of Medicine, Feb. 15, 1922.

The nomenclature used in the description of this deformity does not resemble the cleft of the hare's lip, which is located in the medium line bifurcating to each nostril (see illustration Fig. I) but may affect any part of the lip.

The cleft in the lip of the human being may exist as a mere notch in the vermillion border (see illustration, Fig. 2), or it may continue into the floor of the nose (see illustration, Fig. 3).

Hare lip may be divided into (a) single or unilateral hare lip (complete, incomplete); (b) double or bilateral hare lip (complete, Fig. 4, incomplete).

The above classification applies to the usual cases that come to the oral surgeon for correction.

Frequently one finds cases of incomplete hare lip where the tissues above the fissure are not of normal thickness. The covering is nothing more than the skin. It is smooth, does not contain hair follicles and sweat glands. The color is more red and appears to be

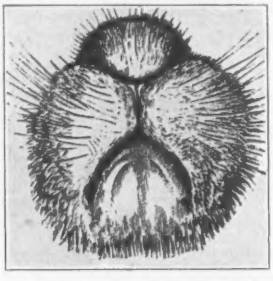


Fig. 1. Hare's Lip.

somewhat like mucous membrane. It may appear like an old scar (see Fig. 5).

In some cases the streak of abnormal skin extends to the floor of the nose, and the nostril is usually wider than the opposite one. These patients when operated on should have all of this abnormal thin covering removed, and cared for like a complete hare lip in order to obtain a good result.

The shape of the nose in complete hare lip is very characteristic. The nostril is broad and flattened out.

The cleft of the lip is more common on the left side than on the right. Rose reports that Muller found 142 left sided against 62 right sided clefts.

Mason, out of 65 cases found 54 to be unilateral, and of these 35 left sided to 19 on the right.

Kolliker mentions that of 165 unilateral clefts, 113 were on the left side, and 62 on the right.

In my own observation of 80 cases I find that 70 per cent had a cleft on the left side.

Double hare lip is a condition where the fissure may be complete or incomplete on both sides, or it may be complete on one side and incomplete on the other.

When the fissure is complete on each side the nostrils are flattened outward. The vermillion border on each side of the fissure extends into the nostril. The central part of the lip frequently extends forward on account of the protrusion of the os incisivum which it covers. (See illustration, Fig. 7.)

When this occurs the alveolar process has a double cleft which unites at about the position of the anterior palatine canal, and then may extend backwards as a single cleft of the hard and soft palate (see illustration, Fig. 6).

In a large number of cases where there is a single hare lip and a single cleft of the alveolar process the premaxillary bone is turned outward and protrudes, causing the nose to be shifted to one side. In such cases the vomer is usually deflected.

When to Operate. As a general rule, the repair of a hare lip should be done as soon after birth as is possible. I usually operate on these cases three to four weeks after birth. While the earlier operation is considered imperative, the surgeon must take into consideration the degree of deformity, and the amount of vitality the patient has. Frequently patients possess a low vitality due to inherited weakness, or to inability to receive nourishment properly owing to the cleft of the lip and palate. I do not believe that a set of rules can be laid down as to when to operate, as it is up to the surgeon to carefully weigh and consider the patient's vitality and resistance to withstand the shock of the operation, or any complication that may arise.

Treatment—Preoperative Care. When a child is born with a hare lip the mother should not be allowed to see the infant until the borders of the lip are brought together as close as is possible, and held so by a strip of adhesive tape. (See illustration, Fig. 8.)

It is well to inform the parents that the deformity can be corrected by an operation, and that results are usually very good.

It is of great importance that practitioners who are present at the birth of a child with a hare lip should see to it that the holding of the borders of the cleft are held together, or nearly so, with adhesive tape.

2 3 4

Fig. 2. Showing a notch in the vermillion border.
Fig. 3. Showing a cleft of the lip extending into the floor of the nose.
Fig. 4. A bilateral hare lip.

5 6

Fig. 5. Showing an incomplete hare-lip. The covering is skin without hair follices and sweat glands.
Fig. 6. A double cleft of the alveolar process which unites at about the position of the anterior palatine canal and then extends backward.

Fig. 7. Showing a protrusion of the premaxillary bone.

The chief reason for this pre-operative care is that the pressure brought about by the adhesive tape will greatly assist in molding the lip so that the fissure becomes more narrow. In patients who have a cleft of the lip and alveolar process such treatment often aids in reducing not only the width of the lip cleft, but also narrows the cleft of the alveolar process.

I have seen a number of cases where such preoperative care within three weeks caused a wide extensive cleft of the lip and alveolar process to be considerably narrower.

When one observes a child with a hare lip crying or laughing the sphincter-like action of the orbicularis oris muscle cannot functionate normally, so that when contraction occurs each half of the lip pulls away from the center, and therefore exaggerates the deformity. If, however, the borders of the lip are held together with adhesive tape the child in the act of crying or laughing will fail to widen and evert the edges of the cleft. The tendency then will, by muscular pull, cause the cleft of the lip and alveolar process to become more narrow during the growth of the child.

The narrowing of a cleft during the preoperative care is of great importance to the surgeon in obtaining a better and more cosmetic result.

In cases that have a complete cleft of the lip and alveolar process, and palate, some surgeons recommend the closing of the alveolar cleft first and then at a later time the cleft of the lip, especially so if the Brophy operation is to be performed, as the surgeon has better access to the palate. However, I have abandoned, in most cases, this method for the reason that after the cleft of the lip is closed the sphincter-like action of the orbicularis muscle will usually mold the alveolar cleft so that its borders approximate, and in some cases closure takes place.

In such cases after the cleft of the lip and alveolar process are united I close the palatal cleft several months later. At no time have I found any difficulty, in closing the hard and soft palate, to arise from a previous operation on the lip.

Anesthesia. In my experience I find that ether is the choice anesthesia for operations on hare lip and cleft palate.

The Sorenson ether vapor and asperating apparatus we find suitable for this purpose. It permits free access to the operating field without interfering with the operations of the anesthetists.

The ether vapor is pumped into the mouth through a tube. The nostrils are gently packed with gauze to prevent blood running through the nostrils into the pharynx and larynx.

Fig. 8. The borders of the cleft are held together with adhesive tape as a preoperative care.

Fig. 9. Nelaton operation.

Fig. 10. Graefe operation.

Fig. 11. Koenig operation.

Fig. 12. Haagedorn operation.

Fig. 13. Author's operation.

With regard to the position of the patient I prefer the recumbent posture on a table.

The anesthetist at the head of the table—the assistant and operator on each side—after the parts to be operated on and surrounding area have been thoroughly cleansed—then bathed with 60 per cent alcohol the patient is ready for operation.

Operation for Single Hare Lip. This operation for convenience of description may be divided into four stages:

1. Freezing of the lip from its attachment to the maxilla.
2. Cutting of the borders of the cleft to obtain symmetry of the nostrils—an invisible scar of the lip—and well contoured vermillion border.
3. Insertion of sutures in the skin and mucous membrane.
4. Prevention of lateral tension.

Freeing of the lip from its attachment to the Maxilla. In order to obtain a well formed lip it is of great importance to thoroughly free the lip from its attachment to the maxilla, especially the ala nasi should be dissected freely from its bony attachment so that the flattened and distorted nostril may be made to correspond in shape and size to that on the opposite side.

After making an incision down to the bone the soft tissue can be stripped from this bony attachment with a blunt dissector—this method will minimize bleeding.

If, however, hemorrhage is severe, hot sponge pressure will readily control the flow of blood.

The extent to which the lip should be detached from the bone depends upon the width of the cleft; unless this is done to the extent that the parts to be united can be approximated in their new position without tension, one cannot hope for an artistic mouth.

Hare lips which have been operated upon without doing a free under cutting will usually show a flattened nostril and a triangular scar extending downwards from it.

Cutting of the Borders of the Cleft to Obtain symmetry of the Nostrils—An Invisible Scar of the Lip and a Well Contoured Vermillion Border. This stage of the operation must be done with great care in order to obtain symmetry of the nostril, to avoid a scar and a continuous and well formed muco-cutaneous line or red margin. The cutting away the borders of the lip to obtain union of the two segments of the divided lip is not sufficient. While such procedure will close the cleft it will not avoid the formation of a V-shaped notch at the vermillion border, by subsequent cicatrization.

Quite a number of surgeons endeavor to utilize all of the tissue bounding the cleft of lip. This method is suitable in case the cleft is not extensive and the margins are quite parallel. The preparation of the borders of the lip depends largely on the degree of the deformity. No one method can be universally followed. The surgeon should rely on his own judgment and plan the incisions that are indicated for each case in order to obtain the best result.

From my own experience I am satisfied that a free removal of tissue on each side of the cleft is not justified, neither do I advocate the other extreme to utilize all of the tissue bounding the cleft of the lip.

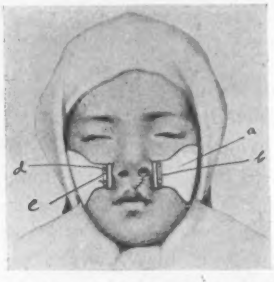


Fig. 14. Author's method of relieving lateral tension.
a—adhevise tape. b—wire ligature. c—German silver plate.
d—perforated shot.

Fig. 15. A complete cleft palate and hare-lip.

The following methods give the reader some idea of the various forms of operation:

When a cleft of the lip is of moderate extent and does not involve all of the lip extending into the nostril, the Nelaton method may be followed.

This operation is done by making an incision through the lip above the angle parallel with the defect. The vermillion border will then drop downward. (See illustration, Fig. 9.)

The lower border of the wound is drawn downward and the sides of the wound sutured. This will cause the vermillion border to protrude downward. It is claimed that during the healing the shrinkage will be sufficient to form a normal shaped lip.

In my experience I find that this does not always happen, so I have abandoned this method.

The Grafe method will give the lip a better shape. This operation is performed by making a semi-circular incision above the defect as illustrated in Fig. 10.

The first suture is to be placed at the margin of the vermillion border and the skin, so that the sides approximate normally.

This method is quite satisfactory in cases where the notch in the lip is not extensive. If carefully done, one can obtain a splendid contour of the vermillion border.

When the cleft in the lip is more extensive, quite a number of surgeons follow the Konig method. This operation is done by making two vertical incisions in order to cut away the borders of the cleft.

After this is done a slanting incision is made on each side. (See illustration, Fig. 11a.) Then by drawing the wound together (Fig. 11b) and by holding the vermillion borders together and downward and then suturing, a very nice prolabium can be obtained (Fig. 11c).

The Haagedorn method is somewhat similar to the Konig method. The vertical incisions are semi-circular as shown in Fig. 12a, and the later incision slanting somewhat downward (Fig. 12b) shows the wound as it should be (Fig. 12c); the wound sutured. This operation will give a good appearing lip; however, in some cases, especially in those cases that have scar tissue following infection, will form a V-shape notch in the vermillion border.

While there are so many methods advocated for the repair of a hare lip, I find that no one rule can be followed. In the majority of cases that I have operated I find the following method giving the best result: This operation is done by making a slight curved incision downward from the nostril, separating the vermillion border from the skin; then making a downward slanting incision on one side toward the cleft. On the other side a downward slanting incision away from the cleft (see illustration, Fig. 13a).

Fig. 13b shows the cut surface. Fig. 13c the wound sutured.

The planning of these incisions so as to provide a fullness of the vermillion border depends on the thickness of the lip, and the size of the cleft.

Insertion of sutures in the skin and mucous membrane, after the wound is prepared so that the borders will approximate to give the lip the proper form and contour.

It is important that the suture be so placed that the raw surfaces will be in contact without any curling or buckling of the edges, neither should there be any bleeding of the raw surfaces. In our experience we find that fine paraffin silk is the ideal suture material. It does not absorb moisture, and is friendly to the tissue.

After the suturing the next step is overcoming lateral tension. This is important. Unless the wound is put at rest, one cannot hope for a good result. One should not rely on the skin and mucous membrane sutures to hold the raw surfaces together. Various methods maye be used to reinforce these sutures. In our experience we have adopted the following methods:

Adhesive tape is glued to the cheek on each side. The edges near the lip are turned inward. A strong paraffin silk ligature is then passed through the tape into the lip midway between the skin and mucous membrane* in the form of a mattress suture, then by tying the loose ends, sufficient tension can be brought to bear so that the approximating sutures will not tear out from the sphincter-like action of the orbicularis muscle. (Fig. 14.) This simple method puts the lip at rest. The lip is again washed with 60 per cent alcohol, made dry and liquid paraffin sprayed on the lip, so that the sutures are covered with a thin layer of paraffin. In the treatment of single and double alveolar clefts some surgeons recommend the closing of the alveolar cleft first and then at a later time the cleft of the lip, especially so if the Brophy operation is to be performed.

I have abandoned in most cases this method, especially in cases that come to me at an age where it is possible by preoperative care to cause the cleft to become narrower through pressure brought about by adhesive tape.

After the lip is closed the sphincter-like action of the orbicularis muscle will continue to mold the alveolar cleft so that it borders approximate and in some cases closure takes place. If, however the borders fail to unite, I usually cauterize the borders in order to obtain a complete organization of the approximating borders to obtain union. If the patient is at an age when the strapping of the adhesive tape will not cause a narrowing of the alveolar cleft, I close the cleft by producing a green stick fracture of the alveolar process, thereby preserving the shape of the dental arch. This is best illustrated in the following case:

*Silver wire is also used as illustrated in Fig. 14.

Patient, E. S.; female, 9 years; excellent health; had congenital cleft of the lip, alveolar process and soft palate (see illustration, Fig. 15). Notice the alveolar process is divided between the left central and the rudimentary left lateral. The alveolar process on the right side was turned outward and protruded to such an extent

16 a Fig. 17 b

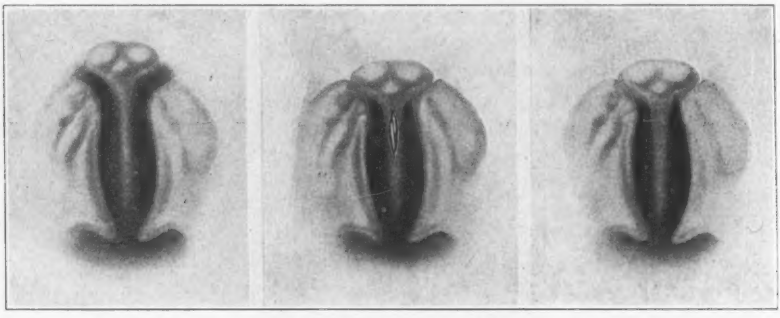
Fig. 16. Showing method of immobilizing the fractured bone with an alignment wire to which the anterior teeth were ligated.

Fig. 17. (a) Plaster cast before operating, showing divided upper arch. (b) Plaster cast after operation and the arch ready for orthodontic treatment.

Fig. 18. Result after operation.

that it caused a distortion in that region. It was necessary to reconstruct the shape of the dental arch before doing anything further. The patient was anesthetized under ether, and incision was made between the right deciduous cuspid and right permanent lateral. The muco-periosteal flaps were raised and retracted, the exposed bone was cut one-half its thickness by a narrow, long fissure

bur; then by forcible pressure the protruding alveolar process containing the lateral and two centrals was brought in contact with the alveolar process on the opposite side, thus producing a green stick fracture. The borders of the cleft were freshened and held together with an orthodontic appliance (see illustration, Fig. 16). The patient's mouth was kept as clean as possible and four weeks later after union had taken place, the appliance was removed. This operation restored to a fair degree the shape of the dental arch (see illustration, Fig. 17), and as a result the cleft of the lip became narrower. When I operated upon the patient the second time for the correction of the lip, I obtained better results than if I had attempted closing the lip before the shape of the dental arch had been restored. (See illustration, Fig. 18.)



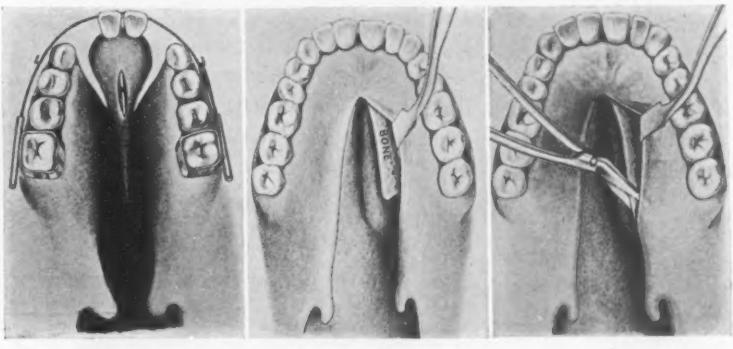
a b c

Fig. 19. () A drawing of the palotal view to show the double cleft and protruding premaxillary of patient shown in Fig. 13 before operating.
Fig. 19. (b) Showing the vomer cut so that the os incisivum can be forced into its new position.
Fig. 19. (c) Showing the premaxillary bone wired in its new position.

After the correction of the alveolar cleft and the cleft of the lip, the patient is usually discharged for about six months, at which time the cleft of the palate is closed.

Should there be a double alveolar cleft where the central portion of the os incisium is displaced forward and attached to the tip of the nose, I usually cut the vomer to allow the septum to overlap when the protruding os incisium is forced backwards. Then by passing wire suture through the vomer, and freshening the approximating surfaces of the borders of the alveolar cleft, good results are obtained. (See illustration, Fig. 19.) The lip then is closed several weeks later.

In cases where the patient is older and the teeth are erupting, I find that cutting of the vomer is not sufficient to force the protruding os incisium in its new position. In these cases I resort to orthodontic care (see illustration, Fig. 20). Bands with buccal tubing are fitted and cemented to the molar teeth, and alignment wire fitted to the arch to rest on the incisors and passing through the buccal tubing. To the alignment wire is soldered hooks; rubber bands are then stretched from the buccal tubing to the hooks. These rubber bands are to be replaced daily. After the patient is accustomed to the orthodontia appliance, I operate on the vomer by doing a submucous resection.



20 .. 21 .. 22

Fig. 20. Illustrates a method of drawing the protruding premaxillary backwards.
Fig. 23. Separating the soft tissues from the bone.
Fig. 24. Cutting the tissue loose from the posterior surface of the horizontal plates of the palate bone.

The orthodontia treatment will then gradually shift the protruding mass in its position. The borders are then cauterized to promote fusing of the tissue. The lip is then operated on.

If, however, the os incisium is undeveloped, the teeth decayed, pulp diseased, and there is a chronic inflammatory process going on, I find it advisable to remove the protruding mass. This is done by stripping loose the soft tissue and suturing it across the gap to act as a good stump for restoration with artificial teeth.

In my experience in the repair of alveolar clefts, I find that after having followed the Brophy method closely in operating on these defects I would frequently destroy some of the tooth buds. I have also observed that the end results of this technique by excellent cleft palate operation, was similar to my results. The loss of several

teeth would prevent the upper jaw of normal development. It had a tendency to start a so-called progressive malocclusion. The upper jaw remaining stunted, leaving the patient after the passing of years with an infantile jaw called Micrognathia.

The lower jaw appears to protrude and the upper jaw is undeveloped. While it is true that many of these cases can be benefited by orthodonic care,—orthodontists agree that to accomplish this there must be a sufficient number of teeth to stimulate growth of the jaw for normal development.

By observing Fig. 23 you will notice a number of teeth missing. It is a cast of the upper jaw of a young lad who was operated on for cleft palate in infancy. The parents informed me that the patient was two months of age when the operation was performed; that wire was passed through the jaw and then through lead plates on each side of the arch; that these wires were twisted until the front of the cleft was closed, and since the operation nothing was done to close the remaining part of the palatal cleft.

The upper arch appeared undeveloped and the lower jaw protruded. This inharmonious relation of the arches gave the boy a rather unpleasing appearance. The bicuspids, left lateral and the right cuspid were missing. The only permanent teeth in the upper jaw that had erupted were 6-2-1-1-6.

The other teeth are deciduous. The centrals are in marked lingoversion. The missing teeth, no doubt, were brought about by the operation in the attempt to close the cleft. While this may not happen by operators who claim that the passing of wire through the jaw to repair a cleft does not destroy the tooth buds, I am of the opinion that this method of operating for the repair of the cleft will destroy tooth buds in the majority of operations that are done in this way. The loss of a number of permanent teeth in a contracted and undeveloped upper arch is difficult to correct by orthodontia care.

Such cases have been treated by us for a number of years. While the improvement was remarkable, we can never hope for results as beautiful and effective as when the teeth are not missing. Let us compare this case to Fig. 24. This shows the result which can be achieved in developing the upper jaw, restoring the forces of mastication, improving the facial lines and enlarging the nasal channels. In this case there were a sufficient number of teeth to fit the proper appliance to obtain the right results. The object of comparing these two cases is to impress upon operators the importance of preserving the deciduous and permanent teeth when operating

Fig. 23. Cast showing the toes of a number of permanent teeth from injury by passing wire through the arch in the attempt to close the cleft.

Fig. 24. A marked deformity which was corrected by Orthodontic care.

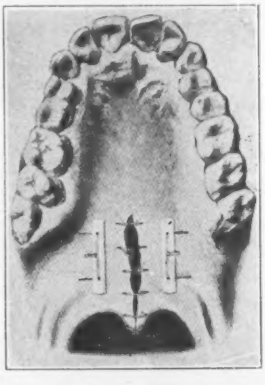


Fig. 25. Showing wire cutting through soft tissue; therefore, not overcoming lateral tension.

upon cleft palate cases, in order to permit further care, if necessary through orthodontic means.

After the alveolar cleft and hare lip is repaired, the next step is the closing of the palatal cleft. Before attempting to repair a cleft of the hard and soft palate, the operator should be well informed on the advantage and disadvantage of surgical care or the substituting of an obturator for the restoration of function.

I have observed in my experience a large number of cases where surgery was resorted to for the correction of a cleft palate, the end result being anything but satisfactory.

While the opening was closed, the soft palate was short and immovable from the large amount of scar tissue that function was impossible. In other cases I have observed patients wearing an artificial palate and velum which did little or no good to improve function.

I do not consider that a set of unalterable regulations can be established as to whether a mechanical substitute or surgical correction is best suited for the patient, but I do know that unless one has had a training in correcting a cleft palate by mechanical restoration and surgical repair he cannot be in a position to judge what is best fitted for the patient's welfare.

The oral surgeon who manifests a desire to give his patient that which is best, cannot ignore the value of an artificial palate. In cases where surgical correction has its limitations, the crude methods that have been employed by a large number of surgeons to close a cleft palate by making long lateral incisions, or the reflected flap method, may, and frequently do, close the cleft. The result as far as function goes must be considered a failure. Unless one is satisfied that there is a sufficient amount of tissue to bridge over the gap and the soft palate can be lengthened to establish a functionating velum, then it is far better to advise the patient to wear an artificial palate.

For a number of years I followed the methods of the world's best oral surgeons for the surgical repair of a cleft of the hard and soft palate. In some of the cases the result was excellent—some were a partial failure, and in a large number a complete failure. While I could usually approximate the borders of the cleft after freeing of the muco-periosteal flaps, without making lateral incisions, I found it a difficult task to overcome lateral tension. If I made lateral incisions, scar tissue would fill in the lateral wounds and the result would be a short and stiff drum-like palate. While the cleft was usually closed I could not feel else but that my results and the cases operated on by others were not as they should be.

Ten years ago I adopted a new method for the relief of lateral tension which would overcome the necessity of making lateral incisions. In 1916 I reported my results before the Kansas City Dental Society. Since that time I have applied this method in every case for the repair of a cleft of the hard and soft palate with results far better than any method I had followed heretofore.

In order to fully appreciate my method in the relief of lateral tension in cleft palate operations, I will describe the technique of combined uranoplasty and staphylorrhaphy. The method universally employed is Langenbeck's, which consists of the following steps:

1. Freeing of muco-periosteal flaps.
2. Freshening the edges of the cleft.
3. Placing and tying of sutures.
4. Relief of lateral tension.

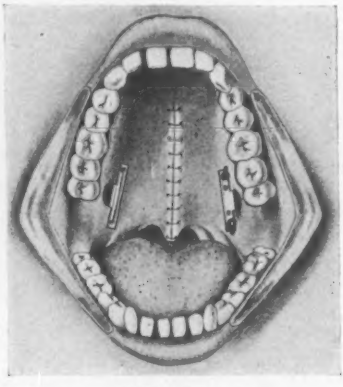


Fig. 26.

Freeing of the Muco-Periosteal Flaps. This procedure is accomplished by cutting the mucous membrane along the entire borders of the cleft and separating the soft tissue by periosteal elevators and cutting the tissue loose from the distal surface of the horizontal plates of the palate bone. (See illustration, Fig. 21 and Fig. 22.) This should be done with great care in order to prevent tearing or lacerating, which may seriously impair nutrition. Naturally this brings on considerable hemorrhage, which can be stopped by firmly pressing a sponge gauze against the bleeding surface. It is not always possible to avoid wounding the anterior palatine and especially the posterior palatine artery. Should one of the vessels be nicked it will cause severe and prolonged hemorrhage. It is there-

fore better to completely divide the vessel so that it will contract as it ends, thereby overcoming protracted bleeding.

Freshening the Edges of the Cleft. This can best be accomplished by grasping the uvula on one side with a catch forcep and putting tension on the soft tissues, then with a very sharp thin-bladed knife cut a thin marginal strip along the entire flap from the uvula to the apex of the cleft. This same procedure is to be carried out on the opposite side. The freshened surface should be cut square with the flap tissue. A beveled surface is conducive to inviting failure. If the raw surfaces are cut square, it is an easy matter to bring them together in close apposition which will enable rapid union during the healing period. In cases where there seems to be a shortage of tissue in the soft palate I prefer to split the

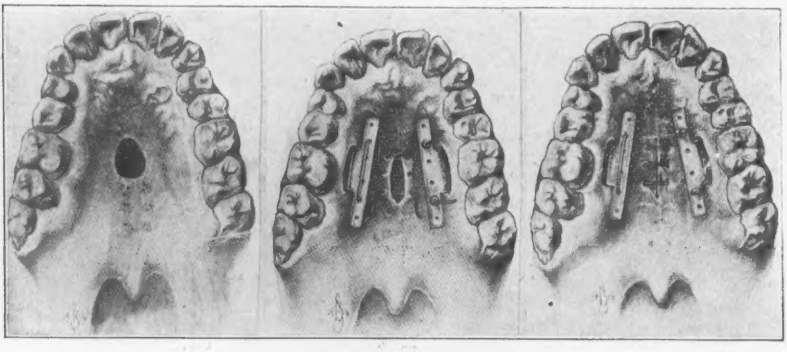


Fig. 27. Fig. 28. Fig. 29.

border of the velum about one-eighth of an inch and then unite the raw surfaces.

Placing and Tying of Sutures. Various kinds of suture material have been adopted for holding the pared edges together, such as silk, horse-hair, linen, catgut, wire, etc. Personally I do not believe that the difference in value of the above named suture material is of any great consequence, providing the operator does not depend upon the same to overcome lateral tension. Sir William Ferguson, in 1844, recognized that the tension on the ligatures frequently invited failure, either through their cutting out or by shutting off the circulation, thereby bringing on starvation necrosis and infection. To overcome this tension Ferguson divided the levator palati, the palato-glossi and the palato-pharyngeal muscles. In 1860 Dr.

Agnew believed that the tensor palati muscles were responsible by pulling the newly approximated surfaces on the soft palate apart, thus causing the sutures to pull out. Therefore he advocated making an incision close to the hamular process of the sphenoid bone, and in this way overcoming tension. For a long time these methods were extensively adopted by operators in this and foreign countries. The end results were not satisfactory. This was pointed out in a paper by Dr. T. W. Brophy in 1901, in which he says, "The formation of cicatrices following incision renders the soft palate thick and unyielding, so that its function is performed imperfectly." Dr. Brophy finds it unnecessary to cut the muscles on either side; it was he who introduced the application of lead plates. The advantages claimed for these plates are to render the palate inflexible and the prevention of the cutting out of the sutures. Dr. Blair reports that he has discontinued the use of lead plates as a retention device be-

Fig. 30.

cause they occasionally caused sloughing, in spite of every care; he depends entirely upon the sufficient freeing of the flaps. In my experiences I have never found that the plates cause sloughing, but that they did not prevent the suture from cutting through. (See illustration, Fig. 25.) They are, however, of a distinct advantage in rendering the palate inflexible. In order to prevent the cutting of the suture through the soft tissue I have devised a new tension plate which will prevent the suture material from cutting out and at the same time relieve the tension as well as render the palatal tissues inflexible. These plates are made from non-corrosive metal B. I. B. American gauge 22, in various sizes.

The object of these plates is to prevent the cutting out of the wire ligature which frequently happens with the Brophy plates. In order to fit these plates it is necessary to make a small incision near the gingival border of the last molar, being careful not to cut the palatine artery. (The operator must take into consideration the degree of the cleft, the position of the blood vessels and the size of plate

that best suits his purpose.) The incision should be of sufficient length to permit the flange of the plate to enter and lie between the palatal bone and soft tissue. Previous to fitting these plates it is necessary to pass silver wire (American gauge 24) through the muco-periosteal flaps and then through the holes in the plates. The ends of the wire are then passed through perforated lead shot and made tense by pulling the wire and crushing the shot after the borders of the flaps can be approximated without tension. After this is done I denude the border of the cleft and then place and tie the coaptating sutures after the McCurdy method.

While to the beginner it is rather a difficult procedure to properly fit these plates, he can, with a little patience, soon master the technic of this simple procedure as an aid in obtaining uniform anatomical, as well as physiological results.

Fig. 26 is a palatal view of the cleft closed, with the plates in position. When these plates are properly fitted and placed in position, and held so with wire ligature, there should be no tension of the ligatures holding the borders of the cleft together.

Fig. 27 illustrates the so-called button hole opening in the center of the palate. This form of opening usually is the end result in the attempt to close the hard and soft palate.

Figs. 28 and 29 show the advantage of using the author's tension plates for closing the opening.

Fig. 30 shows the cleft involving the hard and soft palate, and the result after the operation. This case was operated on, the patient being thirty years of age, and was done in one operation by using the author's tension plates.

695 Astor Street.

PULMONARY ASPECTS OF TONSILLECTOMY UNDER GENERAL ANESTHESIA.*

Dr. Mervin C. Myerson, Brooklyn, N. Y.

The subject of pulmonary complications following tonsillectomy has been receiving a great deal of attention in medical circles and the literature on this subject is steadily increasing. Bassim[1] in the Thesis Paris, in 1913, and Richardson[2] in this country in 1912, were the first to call our attention to those complications. The former writer confined his observations to the sequellae in children. Manges[3] in 1916 awakened the profession with his report of nine cases. Since then Scudder[4], Lewis[5], Richardson[6], Frank[7], Clayton[8], Lord[9], and a host of others in this country and Burger[10] and Jacobson[11] in Europe have contributed to the literature by their reports of cases of abscess of the lung following tonsillectomy. Each has given his views as to the causative factors, and the route of infection. In 1916 Clayton said, "There is something wrong in the way these operations are being done or in the way the anesthesia is given, or both." It must be admitted, however, that the statements and conclusions which have been advanced thus far, are the result of general clinical deductions and have for the most part only a hypothetical basis. It is not unfair to say that factors of considerable influence have been overlooked in the previous consideration of this very important subject.

As yet no evidence has been offered concerning the conditions that obtain in the tracheo-bronchial tree immediately after tonsillectomy under general anesthesia and to what factors in the operation these conditions may be due. It is with these phases of the subject that this paper is chiefly concerned. A study of the tracheo-bronchial tree and its contents immediately after tonsillectomy under general anesthesia was undertaken at the Kings County Hospital in a series of one hundred consecutive cases. Not only the tracheo-bronchial content, but every factor that might influence it was investigated.

A chart was kept containing the following data: the name, age, preoperative condition of the patient, the amount of ether used and the time required for induction of anesthesia, the type of respiration, the position of the patient, the type and duration of the operation, the presence or absence of depression of the hyoid bone, the amount

*A study of the tracheo-bronchial content in one hundred tonsillectomies under general anesthesia. From the Department of Laryngology, Kings County Hospital. Service of Dr. Hubert Arrowsmith.

of hemorrhage, the type of suction used and its application, the presence or absence of the laryngeal reflex during operation, the presence or absence of vomiting during the induction of anesthesia, during the operation or after the operation. When the bleeding was entierly controlled and the pharynx was dry, a direct laryngoscopy and tracheo-bronchoscopy was performed. The content of the larynx, trachea and each main bronchus was noted. Three weeks after operation members of the staff of the social service department visited each home and obtained information concerning the after effects of the operation with special reference to the pulmonary tract.

In all of these operations a modified Sluder instrument was used. The Arrowsmith Sluder Tonsillectome was employed in 80 cases, the Demarest Sluder in 13 and the Douglass Sluder in 7. No sponges were applied in the tonsillar fossa except where there was frank bleeding. For adenoidectomy the La Force instrument with a universal handle was used routinely, and a Gottstein or Barnhill curette was employed once or twice where indicated, immediately after this instrument. The naso-pharynx was then wiped with the index finger covered with gauze. Where the contents of the crypts were expressed the operator immediately caught and removed it.

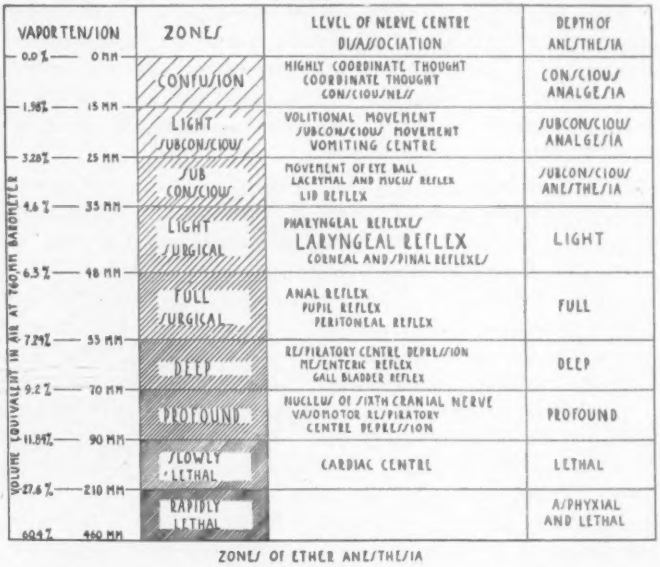
The average age of the subjects was 7.53 years, the oldest was 15 and the youngest 2 years old. The preoperative condition of the patients was carefully checked both by history and physical examination in each case. If the patient gave a history of acute illness within a period of three weeks of the date set for operation, that patient was eliminated and advised to return at some future date. An increase in temperature or signs of possible cardiac embarrassment, in fact, any abnormalty in the patient's condition which might cause him to be a risk, was considered sufficient reason for postponement of the operation.

Ether was used exclusively in this study and was given by the open cone method. The average time required for the induction of anesthesia was 9.58 minutes, the average amount of ether consumed was 2.24 ounces. The anesthetic was not continued on the operating table; the usual procedure of etherizing the patient in an adjoining room and transferring him when anesthetized to the operating table, was adopted in this study. Patients so anesthetized were kept on the table for as long as fifteen minutes or more without any untoward results or interference with the operator. No patient was removed from the table until he had reacted fairly well from the anesthesia.

The depth of the anesthesia, the type of respiration, and the absence or presence of the laryngeal reflex are very closely related. The belief that the laryngeal reflex should be present and that a dangerously profound anesthesia is required to abolish it would seem to be erroneous. The following table shows that the laryngeal reflex is lost during light anesthesia[12].

In speaking of the stage of induction in anesthesia, P. J. Flagg[13] says: "The normal reflexes of the pharynx and larynx are to be abolished. These membranes must be rendered insensitive to any concentration of ether vapor. In the presence of these reflexes the

FIG. I



patient will not be anesthetized. Vapor which is intolerable to these membranes in their normal state is of insufficient strength to put the patient to sleep."

The respirations were recorded as shallow and not shallow; 41 cases falling under the former heading and 59 under the latter. It was observed that any obstruction to the air passages would affect the type of breathing. This was particularly noticed when the hyoid bone was depressed. The open cone method favors a shallow respiration, there being less chance for an accumulation of carbon dioxide than when the closed method of anesthesia is used. The shallow respirations which are produced by a deep

anesthesia and the employment of the open cone method of administration, continue throughout the operative procedure unless something happens to stimulate the respiratory apparatus to increased effort. A light anesthesia was produced in 22 cases, in the remaining 78 a fairly deep anesthesia was produced. By light anesthesia in this work is meant anesthesia that permits the existence of the laryngeal reflex at the beginning of the operation. The average time of recovery, which is measured from the time of withdrawal of the anesthetic until the beginning return of consciousness, was approximately 15 minutes.

Three patients were operated upon with their heads at the same level as the rest of the body, the remaining patients were operated upon with their heads placed on the end of the table which was dropped to an angle of forty-five degrees. The average duration of operation was 9.48 minutes. This was measured from the time the mouth gag was inserted until the throat was free from blood and the suction tip withdrawn.

Depression of the hyoid bone was noted in 45 cases. Depression of the hyoid bone from any cause whatever, creates a resultant depression of the larynx and partly or entirely prevents air from entering or leaving the lungs. When no air or an amount less than required is entering the alveoli, there is produced an increase in the carbon dioxide tension of the alveolar air. This in turn causes an increase in the carbon dioxide content of the blood, which stimulates the medullary center of respiration. This stimulation when it is sufficient causes a sudden relaxation of the glottis and an increase in the frequency and depth of the respiratory movements, until the carbon dioxide and oxygen level returns to normal[14]. McLeod[15] further emphasizes this point when he says: "The respiratory center is so sensitive to carbon dioxide that whenever the carbon dioxide in the inspired air (or the air temporarily locked up by the depression of the hyoid bone) tends to rise, there is an excitation given forth by which pulmonary ventilation becomes forceful enough to maintain the carbon dioxide tension in the alveolar air at a normal level."

It has been repeatedly noticed that a mouth gag opened too wide for a given patient will produce depression of the hyoid region and cyanosis. Too forceful pressure with the tongue depressor also causes a depression of the hyoid bone. The most frequent and most important factor, however, is the pressure of the tonsillectomy instrument upon the lower jaw, which is transmitted so as to press upon the hyoid region and larynx and thus shut off the air passages. The

TABLE I—Showing Records of Influencing Factor
Tonsillectomies Under Genera

No.	Name	Age	Anesthesia Ether Ozs.	Anesthesia Induction Min.	Respiration	Operation Type	Operation	Duration Min.	Depression Hyoid Bone	A
1	J. S.	6	2	10	Not shallow	Sluder-	Arrowsmith	15	Yes	
2	A. H.	9	2½	8	Shallow	Sl.	Arr.	15	No	
3	A. G.	4	2½	7	Shallow	Sl.	Arr.	12	No	
4	H. I.	3	1¾	7	Not shallow	Sl.	Arr.	8	No	
5	E. J.	8	1¾	6	Not shallow	Sl.	Arr.	13	No	
6	R. I.	8	2	7	Shallow	Sl.	Douglass	6	No	
7	G. S.	4	1¾	6	Not shallow	Sl.	Doug.	6	Yes	
8	D. C.	9	2¼	8	Not shallow	Sl.	Doug.	6	Yes	
9	J. C.	11	2	8	Shallow	Sl.	Doug.	12	No	
10	G. M.	13	2½	7	Shallow	Sl.	Doug.	11	No	
11	S. C.	15	1½	5	Not shallow	Sl.	Doug.	10	Yes	
12	G. M.	14	2	5	Shallow	Sl.	Doug.	10	No	
13	R. M.	6	1½	5½	Shallow	Sl.	Demarest	11	No	
14	F. M.	9	2½	8	Not shallow	Sl.	Dem.	13	Yes	
15	L. A.	11	3½	9	Shallow	Sl.	Dem.	11	No	
16	V. O.	13	3	7	Not shallow	Sl.	Dem.	14	Yes	
17	S. C.	8	4	9	Not shallow	Sl.	Dem.	12	Yes	
18	S. A.	6	3	7	Not shallow	Sl.	Dem.	13	Yes	
19	A. B.	2	2½	8	Shallow	Sl.	Arr.	9	No	
20	H. H.	10	3	9	Not shallow	Sl.	Arr.	10	Yes	
21	S. G.	5	2½	9½	Shallow	Sl.	Arr.	9	No	
22	B. H.	7	2½	8	Shallow	Sl.	Dem.	9	No	
23	S. L.	8	2½	8½	Not shallow	Sl.	Dem.	8	Yes	
24	N. B.	9	3½	7	Not shallow	Sl.	Dem.	9	Yes	
25	A. K.	10	2	8½	Not shallow	Sl.	Dem.	7	Yes	
26	E. R.	6	2½	7	Not shallow	Sl.	Dem.	9	Yes	
27	L. K.	10	2	7	Not shallow	Sl.	Dem.	7	No	
28	F. C.	5	1¼	7	Not shallow	Sl.	Dem.	7	Yes	
29	J. T.	3	1¼	8	Shallow	Sl.	Arr.	6	No	
30	E. G.	5	4½	15	Not shallow	Sl.	Arr.	9	Yes	
31	J. J.	2	2¼	11	Shallow	Sl.	Arr.	10	No	
32	J. W.	4	2½	10	Shallow	Sl.	Arr.	8	No	
33	T. S.	6	2½	10	Not shallow	Sl.	Arr.	7	Yes	
34	A. S.	8	3½	16	Not shallow	Sl.	Arr.	9	Yes	
35	J. T.	3	2½	11	Not shallow	Sl.	Arr.	7	No	
36	N. S.	8	2½	7	Not shallow	Sl.	Arr.	7	No	
37	M. C.	6	2½	5	Not shallow	Sl.	Arr.	18	Yes	‡
38	J. C.	8	3½	20	Not shallow	Sl.	Arr.	9	Yes	
39	W. C.	7	2½	7	Not shallow	Sl.	Arr.	11	Yes	
40	N. C.	7	2½	8	Shallow	Sl.	Arr.	11	No	
41	B. W.	8	2	10	Shallow	Sl.	Arr.	10	No	
42	L. S.	11	2	11	Not shallow	Sl.	Arr.	11	No	
43	F. O.	8	1½	8	Not shallow	Sl.	Arr.	9	Yes	
44	R. L.	12	2½	10	Not shallow	Sl.	Arr.	18	No	‡
45	J. C.	8	2	9	Not shallow	Sl.	Arr.	7	Yes	
46	L. H.	3	1½	6	Not shallow	Sl.	Arr.	10	Yes	
47	I. C.	6	2	7	Not shallow	Sl.	Arr.	8	No	
48	F. C.	10	2	10	Shallow	Sl.	Arr.	8	No	
49	D. G.	9	1½	8	Shallow	Sl.	Arr.	11	No	
50	E. B.	8	1½	8	Shallow	Sl.	Arr.	10	No	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Factors, and Findings in the Tracheo-Bronchial Tree General Anesthesia, with Follow-up Notes.

ression Hyoid Bone	Hemorrhage Amount	Suction	Laryngeal Reflex	Vomiting	Larynx	Contents Trachea
Yes	‡ ‡ ‡	Not constantly applied	Yes	After	Clean	‡ ‡
No	‡ ‡ ‡	Not constantly applied	Yes	After	Clean	‡
No	‡ ‡	Not constantly applied	Yes	No	Clean	Clean
No	‡ ‡	Not constantly applied	Yes	No	‡	‡ ‡
No	‡ ‡	Not constantly applied	Yes	After	‡	‡ ‡
No	‡ ‡	Not constantly applied	No	No	Clean	Clean
Yes	‡ ‡	Not constantly applied	Yes	No	‡	‡
Yes	‡ ‡	Not constantly applied	No	No	‡	‡ ‡
No	‡ ‡ ‡	Not constantly applied	Yes	No	‡	‡ ‡
No	‡ ‡	Not constantly applied	Yes	No	‡	‡ ‡
Yes	‡ ‡ ‡	Constantly applied	Yes	After	‡	‡ ‡
No	‡ ‡ ‡	Constantly applied	Yes	No	‡	‡
No	‡ ‡ ‡	Not constantly applied	No	After	Clean	Clean
Yes	‡ ‡	Not constantly applied	Yes	No	‡	‡ ‡
No	‡ ‡	Not constantly applied	Yes	After	Clean	Clean
Yes	‡ ‡	Not constantly applied	Yes	No	‡	‡ ‡
Yes	‡ ‡	Not constantly applied	Yes	After	‡	‡ ‡
Yes	‡ ‡	Not constantly applied	Toward end	After	‡	‡ ‡
No	‡ ‡	Not constantly applied	No	No	Clean	Clean
Yes	‡ ‡	Constantly applied	Toward end	After	‡	‡ ‡
No	‡ ‡ ‡	Not constantly applied	No	After	Clean	Clean
No	‡ ‡ ‡	Constantly applied	No	After	Clean	‡
Yes	‡ ‡	Not constantly applied	No	No	‡	‡ ‡
Yes	‡ ‡	Constantly applied	Toward end	No	‡	‡ ‡
Yes	‡ ‡	Not constantly applied	Toward end	No	‡	‡ ‡
No	‡ ‡	Not constantly applied	No	No	Clean	Clean
Yes	‡ ‡ ‡	Constantly applied	No	No	‡	‡ ‡
No	‡ ‡ ‡	Constantly applied	No	No	‡	Clean
No	‡ ‡ ‡	Not constantly applied	No	No	‡	‡
Yes	‡ ‡ ‡	Not constantly applied	No	After	‡ ‡	‡ ‡ ‡
Yes	‡ ‡	Not constantly applied	No	No	‡	‡ ‡
No	‡ ‡	Not constantly applied	No	No	Clean	Clean
No	‡ ‡	Not constantly applied	No	No	Clean	‡
Yes	‡ ‡ ‡	Not constantly applied	Toward end	After	‡ ‡	‡ ‡ ‡
Yes	‡ ‡ ‡	Not constantly applied	Toward end	No	‡ ‡	‡ ‡ ‡
Yes	‡ ‡ ‡	Not constantly applied	Toward end	No	‡ ‡	‡ ‡ ‡
No	‡ ‡ ‡	Not constantly applied	No	No	‡	‡
No	‡ ‡ ‡	Not constantly applied	No	No	‡	‡
No	‡ ‡ ‡	Constantly applied	No	After	‡	‡ ‡
Yes	‡ ‡ ‡	Not constantly applied	Toward end	No	‡	‡ ‡
No	‡ ‡ ‡	Not constantly applied	Toward end	No	‡ ‡	‡ ‡
Yes	‡ ‡ ‡	Not constantly applied	No	After	‡ ‡	‡ ‡ ‡
Yes	‡ ‡ ‡	Constantly applied	No	After	‡ ‡	‡ ‡
No	‡ ‡ ‡	Not constantly applied	Toward end	No	‡ ‡	‡ ‡
No	‡ ‡ ‡	Constantly applied	No	No	Clean	Clea
No	‡ ‡	Constantly applied	No	After	Clean	Clea
No	‡ ‡ ‡	Constantly applied	No	After	Clean	Clea
No	‡ ‡ ‡	Not constantly applied	No	After	‡ ‡	‡ ‡

ABLE I—Showing Records of Influencing Factors, and Findings in t
Tonsillectomies Under General Anesthesia, with I

sthesia Induction Min.	Respiration	Operation Type		Duration Min.	Depression Hyoid Bone	Hemorrhage Amount	Suction
10	Not shallow	Sluder-	Arrowsmith	15	Yes	‡ ‡ ‡	Not constantly applied
8	Shallow	Sl.	Arr.	15	No	‡ ‡ ‡	Not constantly applied
7	Shallow	Sl.	Arr.	12	No	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Arr.	8	No	‡ ‡	Not constantly applied
6	Not shallow	Sl.	Arr.	13	No	‡ ‡	Not constantly applied
7	Shallow	Sl.	Douglass	6	No	‡ ‡	Not constantly applied
6	Not shallow	Sl.	Doug.	6	Yes	‡ ‡	Not constantly applied
8	Not shallow	Sl.	Doug.	6	Yes	‡ ‡	Not constantly applied
8	Shallow	Sl.	Doug.	12	No	‡ ‡ ‡	Not constantly applied
7	Shallow	Sl.	Doug.	11	No	‡ ‡	Not constantly applied
5	Not shallow	Sl.	Doug.	10	Yes	‡ ‡ ‡	Constantly applied
5	Shallow	Sl.	Doug.	10	No	‡ ‡ ‡	Constantly applied
5½	Shallow	Sl.	Demarest	11	No	‡ ‡ ‡	Not constantly applied
8	Not shallow	Sl.	Dem.	13	Yes	‡ ‡	Not constantly applied
9	Shallow	Sl.	Dem.	11	No	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Dem.	14	Yes	‡ ‡	Not constantly applied
9	Not shallow	Sl.	Dem.	12	Yes	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Dem.	13	Yes	‡ ‡	Not constantly applied
8	Shallow	Sl.	Arr.	9	No	‡ ‡	Not constantly applied
9	Not shallow	Sl.	Arr.	10	Yes	‡ ‡	Constantly applied
9½	Shallow	Sl.	Arr.	9	No	‡ ‡	Not constantly applied
8	Shallow	Sl.	Dem.	9	No	‡ ‡ ‡	Constantly applied
8½	Not shallow	Sl.	Dem.	8	Yes	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Dem.	9	Yes	‡ ‡	Constantly applied
8½	Not shallow	Sl.	Dem.	7	Yes	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Dem.	9	Yes	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Dem.	7	No	‡	Constantly applied
7	Not shallow	Sl.	Dem.	7	Yes	‡ ‡ ‡	Not constantly applied
8	Shallow	Sl.	Arr.	6	No	‡	Not constantly applied
15	Not shallow	Sl.	Arr.	9	Yes	‡ ‡ ‡	Constantly applied
11	Shallow	Sl.	Arr.	10	No	‡ ‡ ‡	Constantly applied
10	Shallow	Sl.	Arr.	8	No	‡ ‡ ‡	Not constantly applied
10	Not shallow	Sl.	Arr.	7	Yes	‡ ‡ ‡	Not constantly applied
16	Not shallow	Sl.	Arr.	9	Yes	‡ ‡ ‡	Not constantly applied
11	Not shallow	Sl.	Arr.	7	No	‡ ‡	Not constantly applied
7	Not shallow	Sl.	Arr.	7	No	‡ ‡	Not constantly applied
5	Not shallow	Sl.	Arr.	18	Yes	‡ ‡ ‡ ‡	Not constantly applied
20	Not shallow	Sl.	Arr.	9	Yes	‡ ‡ ‡	Not constantly applied
7	Not shallow	Sl.	Arr.	11	Yes	‡ ‡ ‡	Not constantly applied
8	Shallow	Sl.	Arr.	11	No	‡ ‡ ‡	Not constantly applied
10	Shallow	Sl.	Arr.	10	No	‡ ‡ ‡	Not constantly applied
11	Not shallow	Sl.	Arr.	11	No	‡ ‡ ‡	Constantly applied
8	Not shallow	Sl.	Arr.	9	Yes	‡ ‡ ‡	Not constantly applied
10	Not shallow	Sl.	Arr.	18	No	‡ ‡ ‡ ‡	Not constantly applied
9	Not shallow	Sl.	Arr.	7	Yes	‡ ‡ ‡	Not constantly applied
6	Not shallow	Sl.	Arr.	10	Yes	‡ ‡ ‡	Constantly applied
7	Not shallow	Sl.	Arr.	8	No	‡ ‡ ‡	Not constantly applied
10	Shallow	Sl.	Arr.	8	No	‡ ‡ ‡	Constantly applied
8	Shallow	Sl.	Arr.	11	No	‡ ‡ ‡	Constantly applied

gs in the Tracheo-Bronchial Tree of 100 with Follow-up Notes.

	Laryngeal Reflex	Vomiting	Contents Larynx	Trachea	Rt. Bronch.	Lft. Bronch.	Follow up report
ly applied	Yes	After	Clean	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	Yes	After	Clean	‡	‡	‡	No untoward sequel
ly applied	Yes	No	Clean	Clean	‡	‡	No untoward sequel
ly applied	Yes	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	Yes	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
ly applied	Yes	No	‡	‡	‡	‡	Cough for 48 h. p. op.
ly applied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	Yes	No	‡	‡	‡	‡	No untoward sequel
ly applied	Yes	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
pplied	Yes	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
pplied	Yes	No	‡	‡	‡	‡	No untoward sequel
ly applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
ly applied	Yes	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	Yes	After	Clean	Clean	‡	‡	No untoward sequel
ly applied	Yes	No	‡	‡ ‡	‡ ‡	‡ ‡	Cough sev. ds. p. op.
ly applied	Yes	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	Toward end	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
pplied	Toward end	After	‡	‡ ‡	‡ ‡	‡ ‡	Developed septic-semia, in bed several weeks. Operated soon after ac. tonsilitis
tly applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
pplied	No	After	Clean	‡	‡	‡	No untoward sequel
tly applied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
pplied	Toward end	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
tly applied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	Child died 6 days p. op. in another hospital Diag.
tly applied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
pplied	Toward end	No	Clean	Clean	Clean	Clean	No untoward sequel
tly applied	Toward end	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
tly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
pplied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
pplied	No	No	‡	Clean	‡	‡	Cough for few days after operation
tly applied	No	No	‡	‡	‡	‡	Cough since oper.
tly applied	No	After	‡ ‡	‡ ‡	‡ ‡	‡ ‡	Cough since oper.
tly applied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
tly applied	No	No	Clean	Clean	‡	‡	No untoward sequel
tly applied	No	No	Clean	‡	‡	‡	No untoward sequel
tly applied	Toward end	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	Cough 3 days p. op.
tly applied	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
tly applied	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	Cough 2 days p. op.
tly applied	No	No	‡	‡	‡ ‡	‡ ‡	Cough and temperature several days
tly applied	No	No	‡	‡	‡ ‡	‡ ‡	Neck swollen few ds.
applied	No	After	‡	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
tly applied	Toward end	No	‡	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
tly applied	Toward end	No	‡ ‡	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
tly applied	No	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	About 1 hour p. op. both feet adducted strongly-painful. No swelling. lasted almost 24 hours found to be O.K. SS
applied	No	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
tly applied	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel

46	L. H.	3	1½	6	Not shallow	Sl.	Arr.	10	Yes	‡
47	I. C.	6	2	7	Not shallow	Sl.	Arr.	8	No	‡
48	F. C.	10	2	10	Shallow	Sl.	Arr.	8	No	‡
49	D. G.	9	1½	8	Shallow	Sl.	Arr.	11	No	
50	E. B.	8	1½	8	Shallow	Sl.	Arr.	10	No	‡
51	K. H.	7	2½	12	Shallow	Sl.	Arr.	8	No	‡
52	W. H.	8	2	15	Not shallow	Sl.	Arr.	8	No	‡
53	N. F.	6	1½	12	Not shallow	Sl.	Arr.	6	Yes	
54	A. B.	5	1½	8	Not shallow	Sl.	Arr.	7	Yes	‡
55	J. R.	11	1½	8	Shallow	Sl.	Arr.	10	No	
56	T. R.	6	2	13	Shallow	Sl.	Arr.	6	No	
57	V. H.	10	2½	12	Not shallow	Sl.	Arr.	7	No	
58	L. M.	7	2½	12	Not shallow	Sl.	Arr.	7	No	
59	H. B.	4	2	10	Not shallow	Sl.	Arr.	10	Yes	
60	M. B.	10	4	12	Not shallow	Sl.	Arr.	9	Yes	
61	M. N.	12	3	15	Not shallow	Sl.	Arr.	9	Yes	
62	C. C.	7	2	10	Shallow	Sl.	Arr.	8	No	
63	M. C.	5	2	8	Not shallow	Sl.	Arr.	6	No	
64	A. T.	7	2	10	Not shallow	Sl.	Arr.	7	Yes	
65	M. R.	10	1½	5	Not shallow	Sl.	Arr.	8	No	
66	P. T.	8	2	8	Shallow	Sl.	Arr.	6	No	
67	B. A.	9	3	15	Not shallow	Sl.	Arr.	10	No	
68	P. M.	6	1½	8	Not shallow	Sl.	Arr.	15	Yes	
69	M. M.	8	2	15	Not shallow	Sl.	Arr.	18	No	‡
70	M. A.	11	2	15	Shallow	Sl.	Arr.	7	No	
71	M. G.	3	3	10	Not shallow	Sl.	Arr.	8	No	‡
72	S. C.	8	2	9	Not shallow	Sl.	Arr.	9	Yes	
73	C. S.	8	2	13	Shallow	Sl.	Arr.	9	Yes	
74	M. L.	6	2	11	Not shallow	Sl.	Arr.	9	Yes	
75	M. R.	11	2	15	Shallow	Sl.	Arr.	9	Yes	
76	T. R.	9	2	13	Shallow	Sl.	Arr.	8	No	
77	J. M.	4	1	5	Shallow	Sl.	Arr.	8	No	
78	H. S.	10	2	10	Not shallow	Sl.	Arr.	14	Yes	‡
79	E. M.	7	3	11	Not shallow	Sl.	Arr.	8	No	
80	H. M.	5	2	11	Not shallow	Sl.	Arr.	8	Yes	
81	G. S.	7	2	11	Not shallow	Sl.	Arr.	8	No	
82	S. N.	8	2	12	Shallow	Sl.	Arr.	8	No	
83	V. S.	4	1½	7	Shallow	Sl.	Arr.	7	No	
84	L. C.	4	1½	8	Shallow	Sl.	Arr.	7	No	
85	L. H.	6	2	7	Not shallow	Sl.	Arr.	7	Yes	
86	O. B.	5	2	8	Not shallow	Sl.	Arr.	7	Yes	
87	E. H.	9	2	9	Not shallow	Sl.	Arr.	8	Yes	
88	M. C.	9	2	8	Shallow	Sl.	Arr.	8	Yes	
89	H. D.	8	2	8	Shallow	Sl.	Arr.	8	No	
90	E. M.	7	2	11	Not shallow	Sl.	Arr.	9	No	‡
91	P. P.	11	2	6	Shallow	Sl.	Arr.	10	No	
92	P. G.	9	2	10	Not shallow	Sl.	Arr.	9	No	
93	H. B.	7	1½	7	Shallow	Sl.	Arr.	12	No	
94	D. R.	9	3½	27	Shallow	Sl.	Arr.	14	No	
95	G. S.	6	1½	5	Shallow	Sl.	Arr.	10	No	
96	M. T.	11	3	7	Not shallow	Sl.	Arr.	18	No	‡
97	R. M.	8	2½	10	Shallow	Sl.	Arr.	9	No	
98	P. A.	8	3	8	Shallow	Sl.	Arr.	11	No	
99	A. A.	6	2½	9	Not shallow	Sl.	Arr.	9	Yes	
100	J. M.	4	3	15	Shallow	Sl.	Arr.	11	No	

Note: In cases 10, 11, and 12 the head was at the same level as the
rest of the body. In these same cases the electric suction apparatus was u

Average Age 7.53 years
Average Oz. Ether 2.24
Average Induction of ether 9.58 min.
Average duration of operation 9.48 min.

Respiration: Shallow -41 cases; Not shallow-59 cases

Type of Operation Used: Sluder Arrowsmith-80 cases; " Demarest -13 cases; " Douglass -7 cases

Depression: Hyoid Bone: Yes-45 cases; No -55 cases

Hemorrhage: ‡ -3 cases; ‡ ‡ -33 cases; ‡ ‡ ‡ -57 cases; ‡ ‡ ‡ ‡ -7 cases

Suction: Constantly applied; Not constantly ap

Laryngeal Reflex: Yes -22; No -51; Toward end -27

Vomiting: After-38 cases; No-62 cases

Follow up Report: Cough for few day; No untoward sequ; Septicemia-1 case; Double talipes eq; Not found- 1 case; Death-cause quest; Measles-1 case

TABLE II—Showing Those Cases with a Clean Tracheo-Bro

	Anesthesia		Operation		Depression
	Ether	Induction	Type	Duration	Hyoid

Yes	‡	‡	‡	Constantly applied	No	After	‡ ‡	‡
No	‡	‡	‡	Not constantly applied	Toward end	No	‡ ‡	‡
No	‡	‡	‡	Constantly applied	No	No	Clean	Cl
No		‡	‡	Constantly applied	No	After	Clean	Cl
No		‡	‡	Constantly applied	No	After	Clean	Cl
No		‡	‡	Not constantly applied	No	After	‡ ‡	‡
No		‡	‡	Constantly applied	Yes	After		
Yes		‡	‡	Constantly applied	Toward end	No	‡ ‡	‡
Yes	‡	‡	‡	Not constantly applied	No	After	‡ ‡	‡
No		‡	‡	Constantly applied	No	No	Clean	Cl
No		‡	‡	Not constantly applied	No	After	‡	
No		‡	‡	Not constantly applied	Yes	After	‡	
No		‡	‡	Not constantly applied	No	No	‡	
Yes		‡	‡	Not constantly applied	Toward end	No	‡ ‡	‡
Yes		‡	‡	Not constantly applied	Yes	No	‡ ‡	‡
Yes		‡	‡	Not constantly applied	Yes	No	‡ ‡	‡
No		‡	‡	Not constantly applied	No	No	‡	
No		‡	‡	Not constantly applied	Yes	No	‡	
Yes		‡	‡	Not constantly applied	No	No	‡	
No		‡	‡	Not constantly applied	Toward end	No	Clean	C
No		‡	‡	Not constantly applied	No	No	‡	
No		‡	‡	Not constantly applied	Toward end	No	‡	
Yes		‡	‡	Not constantly applied	Toward end	No	‡	
No	‡	‡	‡	Not constantly applied	Toward end	After	‡ ‡	‡
No		‡	‡	Constantly applied	No	No	Clean	C
No	‡	‡	‡	Not constantly applied	Yes	No	‡ ‡	‡
Yes		‡	‡	Not constantly applied	Toward end	No	‡ ‡	‡
Yes		‡	‡	Constantly applied	No	No	Clean	C
Yes		‡	‡	Not constantly applied	No	No	‡	
Yes		‡	‡	Constantly applied	No	No	Clean	C
No		‡	‡	Constantly applied	No	After	Clean	C
No		‡	‡	Not constantly applied	No	No	‡	
Yes	‡	‡	‡	Not constantly applied	Toward end	After	‡ ‡	‡
No		‡	‡	Not constatnly applied	No	No	‡	
Yes		‡	‡	Not constantly applied	No	After	‡	
No		‡	‡	Not constantly applied	No	No	‡	
No		‡	‡	Not constantly applied	No	No	‡	
No		‡	‡	Not constantly applied	No	No	Clean	C
No		‡	‡	Constantly applied	Toward end	No	Clean	C
Yes		‡	‡	Constantly applied	No	After	‡	
Yes		‡	‡	Not constantly applied	No	After	‡	
Yes		‡	‡	Not constantly applied	No	After	‡	
Yes		‡	‡	Not constantly applied	Toward end	After	Clean	C
No		‡	‡	Constantly applied	Toward end	After	Clean	C
No	‡	‡	‡	Not constantly applied	Toward end	After	‡	
No		‡	‡	Constantly applied	Toward end	After	Clean	
No		‡	‡	Constantly applied	Yes	After	‡	
No		‡	‡	Not constantly applied	No	No	‡	
No		‡	‡	Not constantly applied	No	No	Clean	
No		‡	‡	Constantly applied	No	No	Clean	
No	‡	‡	‡	Not constantly applied	Toward end	After	‡	
No		‡	‡	Not constantly applied	Toward end	No	Clean	
No		‡	‡	Not constantly applied	Toward end	After	‡	
Yes		‡	‡	Not constantly applied	Toward end	After	‡	
No		‡	‡	Not constantly applied	No	No	‡	

evel as the rest of the body. In the remaining cases the head was lowered 45 degrees from
ratus was used: in the remaining ninety-seven (97) the water suction apparatus was used.

antly applied -26 cases

onstantly applied-74 cases
-22 cases (present)
-51 cases (absent)
rd end -27 cases
38 cases

cases
n for few days-13 cases
atoward sequel-82 cases
cemia-1 case
le talipes equino varus-1 case
ound- 1 case
n-cause questionable-1 case
es-1 case

Hemorrhage: ‡is considered
‡‡is a moderat
‡‡‡is a moderat
and ligature
‡‡‡‡is frank profu
Tracheo-bronchial content:
‡is a thin film
‡‡is a fair amo
‡‡‡is an amoun
and fairly fi

eo-Bronchial Content and the Influencing Factors

ression			Hemorrhage			Laryngeal			
Hyoid									
Bone	Amount			Suction		Reflex	Vomiting	Lar	

6	Not shallow	Sl.	Arr.	10	Yes	‡	‡	‡	Constantly applied	No
7	Not shallow	Sl.	Arr.	8	No		‡	‡	Not constantly applied	Tow
10	Shallow	Sl.	Arr.	8	No		‡	‡	Constantly applied	No
8	Shallow	Sl.	Arr.	11	No			‡	Constantly applied	No
8	Shallow	Sl.	Arr.	10	No		‡	‡	Constantly applied	No
12	Shallow	Sl.	Arr.	8	No		‡	‡	Not constantly applied	No
15	Not shallow	Sl.	Arr.	8	No		‡	‡	Constantly applied	Yes
12	Not shallow	Sl.	Arr.	6	Yes		‡	‡	Constantly applied	Tow
8	Not shallow	Sl.	Arr.	7	Yes	‡	‡	‡	Not constantly applied	No
8	Shallow	Sl.	Arr.	10	No		‡	‡	Constantly applied	No
13	Shallow	Sl.	Arr.	6	No		‡	‡	Not constantly applied	No
12	Not shallow	Sl.	Arr.	7	No		‡	‡	Not constantly applied	Yes
12	Not shallow	Sl.	Arr.	7	No		‡	‡	Not constantly applied	No
10	Not shallow	Sl.	Arr.	10	Yes		‡	‡	Not constantly applied	Tow
12	Not shallow	Sl.	Arr.	9	Yes		‡	‡	Not constantly applied	Yes
15	Not shallow	Sl.	Arr.	9	Yes		‡	‡	Not constantly applied	Yes
10	Shallow	Sl.	Arr.	8	No			‡	Not constantly applied	No
8	Not shallow	Sl.	Arr.	6	No		‡	‡	Not constantly applied	Yes
10	Not shallow	Sl.	Arr.	7	Yes			‡	Not constantly applied	No
5	Not shallow	Sl.	Arr.	8	No			‡	Not constantly applied	Tow
8	Shallow	Sl.	Arr.	6	No			‡	Not constantly applied	No
15	Not shallow	Sl.	Arr.	10	No			‡	Not constantly applied	Tow
8	Not shallow	Sl.	Arr.	15	Yes		‡	‡	Not constantly applied	Tow
15	Not shallow	Sl.	Arr.	18	No	‡	‡	‡	Not constantly applied	Tow
15	Shallow	Sl.	Arr.	7	No			‡	Constantly applied	No
10	Not shallow	Sl.	Arr.	8	No	‡	‡	‡	Not constantly applied	Yes
9	Not shallow	Sl.	Arr.	9	Yes		‡	‡	Not constantly applied	Tow
13	Shallow	Sl.	Arr.	9	Yes			‡	Constantly applied	No
11	Not shallow	Sl.	Arr.	9	Yes			‡	Not constantly applied	No
15	Shallow	Sl.	Arr.	9	Yes			‡	Constantly applied	No
13	Shallow	Sl.	Arr.	8	No			‡	Constantly applied	No
5	Shallow	Sl.	Arr.	8	No			‡	Not constantly applied	No
10	Not shallow	Sl.	Arr.	14	Yes	‡	‡	‡	Not constantly applied	Tow
11	Not shallow	Sl.	Arr.	8	No		‡	‡	Not constatnly applied	No
11	Not shallow	Sl.	Arr.	8	Yes		‡	‡	Not constantly applied	No
11	Not shallow	Sl.	Arr.	8	No		‡	‡	Not constantly applied	No
12	Shallow	Sl.	Arr.	8	No		‡	‡	Not constantly applied	No
7	Shallow	Sl.	Arr.	7	No		‡	‡	Not constantly applied	No
8	Shallow	Sl.	Arr.	7	No			‡	Constantly applied	Tow
7	Not shallow	Sl.	Arr.	7	Yes		‡	‡	Constantly applied	No
8	Not shallow	Sl.	Arr.	7	Yes		‡	‡	Not constantly applied	No
9	Not shallow	Sl.	Arr.	8	Yes		‡	‡	Not constantly applied	No
8	Shallow	Sl.	Arr.	8	Yes		‡	‡	Not constantly applied	Tow
8	Shallow	Sl.	Arr.	8	No		‡	‡	Constantly applied	Tow
11	Not shallow	Sl.	Arr.	9	No	‡	‡	‡	Not constantly applied	Tow
6	Shallow	Sl.	Arr.	10	No		‡	‡	Constantly applied	Tow
10	Not shallow	Sl.	Arr.	9	No		‡	‡	Constantly applied	Yes
7	Shallow	Sl.	Arr.	12	No		‡	‡	Not constantly applied	No
27	Shallow	Sl.	Arr.	14	No		‡	‡	Not constantly applied	No
5	Shallow	Sl.	Arr.	10	No		‡	‡	Constantly applied	No
7	Not shallow	Sl.	Arr.	18	No	‡	‡	‡	Not constantly applied	Tow
10	Shallow	Sl.	Arr.	9	No		‡	‡	Not constantly applied	Tow
8	Shallow	Sl.	Arr.	11	No		‡	‡	Not constantly applied	Tow
9	Not shallow	Sl.	Arr.	9	Yes		‡	‡	Not constantly applied	Tow
15	Shallow	Sl.	Arr.	11	No		‡	‡	Not constantly applied	No

Note: In cases 10, 11, and 12 the head was at the same level as the rest of the body. In the remaining cases th
rest of the body. In these same cases the electric suction apparatus was used: in the remaining ninety-seven (97) the

- Suction
  - Constantly applied -26 cases
  - Not constantly applied-74 cases
- Laryngeal Reflex
  - Yes -22 cases (present)
  - No -51 cases (absent)
  - Toward end -27 cases
- Vomiting
  - After-38 cases
  - No-62 cases
- Follow up Report
  - Cough for few days-13 cases
  - No untoward sequel-82 cases
  - Septicemia-1 case
  - Double talipes equino varus-1 case
  - Not found- 1 case
  - Death-cause questionable-1 case
  - Measles-1 case

owing Those Cases with a Clean Tracheo-Bronchial Content and the

esia	Operation		Depression		Hemorrhage		
Induction	Type	Duration Min.	Hyoid Bone	Amount	Suction	Laryn Reflex

							swelling, lasted almost 24 hours found to be O.K. SS
	No	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
d	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
	No	No	Clean	Clean	Clean	Clean	No untoward sequel
	No	After	Clean	Clean	Clean	Clean	No untoward sequel
	No	After	Clean	Clean	Clean	Clean	No untoward sequel
d	No	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
	Yes	After	‡	‡	‡	‡	Cough for few days
	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
d	No	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
	No	No	Clean	Clean	Clean	Clean	No untoward sequel
d	No	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Yes	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
d	Yes	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
d	Yes	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untowrad sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Yes	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Toward end	No	Clean	Clean	Clean	Clean	No untoward sequel
d	No	No	‡	‡	‡	‡	No untoward sequel
d	Toward end	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Toward end	No	‡	‡ ‡	‡ ‡	‡ ‡	Cough for few days
d	Toward end	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
	No	No	Clean	Clean	Clean	Clean	No untoward sequel
d	Yes	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	Cough for two weeks
d	Toward end	No	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
	No	No	Clean	Clean	Clean	Clean	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	Not found
	No	No	Clean	Clean	Clean	Clean	No untoward sequel
	No	After	Clean	Clean	Clean	Clean	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Toward end	After	‡ ‡	‡ ‡ ‡	‡ ‡ ‡	‡ ‡ ‡	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	No	Clean	Clean	Clean	Clean	No untoward sequel
	Toward end	No	Clean	Clean	Clean	Clean	Developed measles few days after leaving hospital
	No	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	No	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
d	Toward end	After	Clean	Clean	Clean	Clean	No untoward sequel
	Toward end	After	Clean	Clean	Clean	Clean	Cough and temperature few days p. op.
ied	Toward end	After	‡	‡ ‡	‡ ‡	‡ ‡	Slight cough few ds.
	Toward end	After	Clean	Clean	Clean	Clean	No untoward sequel
	Yes	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
	No	No	Clean	Clean	‡	‡	No untoward sequel
ied	Toward end	After	‡	‡ ‡	‡	‡ ‡	No untoward sequel
ied	Toward end	No	Clean	Clean	‡	‡	No untoward sequel
ied	Toward end	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ied	Toward end	After	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel
ied	No	No	‡	‡ ‡	‡ ‡	‡ ‡	No untoward sequel

ning cases the head was lowered 45 degrees from the
ven (97) the water suction apparatus was used.

Hemorrhage: ‡is considered a negligible quantity.
‡‡is a moderate amount not exceeding two ounces.
‡‡‡is a moderately profuse but not requiring the use of hemostats and ligatures.
‡‡‡‡is frank profuse hemorrhage requiring energetic measures for control.

Tracheo-bronchial content:
‡is a thin film of blood on the posterior wall.
‡‡is a fair amount but not obstructing the view of the lumen.
‡‡‡is an amount of blood sufficient to obstruct the view of the lumen and fairly fill the structure under consideration.

and the Influencing Factors, with Follow-up Notes.

			Contents			
Laryngeal Reflex	Vomiting	Larynx	Trachea	Rt. Bronch.	Lft. Bronch.	Follow up report

94	D. R.	9	3½	27	Shallow	Sl.	Arr.	14
95	G. S.	5	1½	5	Shallow	Sl.	Arr.	10
96	M. T.	11	3	7	Not shallow	Sl.	Arr.	18
97	R. M.	8	2½	10	Shallow	Sl.	Arr.	9
98	P. A.	8	3	8	Shallow	Sl.	Arr.	11
99	A. A.	6	2½	9	Not shallow	Sl.	Arr.	9
100	J. M.	4	3	15	Shallow	Sl.	Arr.	11

Note: In cases 10, 11, and 12 the head was at the sam
rest of the body. In these same cases the electric suction ap

Average Age 7.53 years
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Average duration of operation 9.48 min.

Respiration: Shallow -41 cases; Not shallow-59 cases

Type of Operation Used: Sluder Arrowsmith-80 cases; " Demarest -13 cases; " Douglass -7 cases

Depression: Hyoid Bone: Yes-45 cases; No -55 cases

Hemorrhage: ‡ -3 cases; ‡ ‡ -33 cases; ‡ ‡ ‡ -57 cases; ‡ ‡ ‡ ‡ -7 cases

Suction: Con / Not

Laryngeal Reflex: Yes / No / Tov

Vomiting: Aft / No-

Follow up Report: Cou / No / Sep / Dou / Not / Des / Me

TABLE II—Showing Those Cases with a Clean Trac

No.	Name	Age	Anesthesia Ether Ozs.	Anesthesia Induction Min.	Respiration	Operation Type	Operation	Operation Duration Min.	D
6	B. I.	8	2	7	Shallow	Sluder	Douglass	6	
13	R. M.	6	1½	5½	Shallow	Sl.	Demarest	11	
19	A. B.	2	2½	8	Shallow	Sl.	Arrowsmith	9	
21	S. G.	5	2½	9½	Shallow	Sl.	Arr.	9	
27	L. K.	10	2	7	Not shallow	Sl.	Dem.	7	
29	J. T.	3	1¼	8	Shallow	Sl.	Arr.	6	
48	F. C.	10	2	10	Shallow	Sl.	Arr.	8	
49	D. G.	9	1½	8	Shallow	Sl.	Arr.	11	
50	E. B.	8	1½	8	Shallow	Sl.	Arr.	10	
55	J. R.	11	1½	8	Shallow	Sl.	Arr.	10	
65	M. R.	10	1½	5	Not shallow	Sl.	Arr.	8	
70	M. A.	11	2	15	Shallow	Sl.	Arr.	7	
73	C. S.	8	2	13	Shallow	Sl.	Arr.	9	
75	M. R.	11	2	15	Shallow	Sl.	Arr.	9	
76	T. R.	9	2	13	Shallow	Sl.	Arr.	8	
83	V. S.	4	1½	7	Shallow	Sl.	Arr.	7	
84	L. C.	4	1½	8	Shallow	Sl.	Arr.	7	
88	M. C.	9	2	8	Shallow	Sl.	Arr.	8	
89	H. D.	8	2	8	Shallow	Sl.	Arr.	8	
91	P. P.	11	2	6	Shallow	Sl.	Arr.	10	
94	D. R.	9	3½	27	Shallow	Sl.	Arr.	14	

SUMMARY

Average Age 7.9 yrs.
Average Oz. Ether 1.9
Average induction of ether 9.7 min.
Average duration of operation 9.1 min.

Respiration: Shallow -19 cases; Not shallow-2 cases

Type of Operation Used: Sluder Arrowsmith-18 cases; " Demarest -2 cases; " Douglass -1 case

Depression Hyoid Bone: Yes / No -

Hemorrhage: ‡ ‡ ‡ / ‡ ‡ ‡ / ‡ ‡ ‡

Suction: Cons / Not

10	No	‡ ‡ ‡	Constantly applied	No	No	Clean	Clean
18	No	‡ ‡ ‡ ‡	Not constantly applied	Toward end	After	‡	‡ ‡
9	No	‡ ‡ ‡	Not constantly applied	Toward end	No	Clean	Clean
11	No	‡ ‡ ‡	Not constantly applied	Toward end	After	‡	‡ ‡
9	Yes	‡ ‡ ‡	Not constantly applied	Toward end	After	‡	‡ ‡
11	No	‡ ‡ ‡	Not constantly applied	No	No	‡	‡ ‡

at the same level as the rest of the body. In the remaining cases the head was lowered 45 degrees from the
c suction apparatus was used: in the remaining ninety-seven (97) the water suction apparatus was used.

- Constantly applied -26 cases
- Not constantly applied-74 cases

al
- Yes -22 cases (present)
- No -51 cases (absent)
- Toward end -27 cases

g
- After-38 cases
- No-62 cases

up
- Cough for few days-13 cases
- No untoward sequel-82 cases
- Septicemia-1 case
- Double talipes equino varus-1 case
- Not found- 1 case
- Death-cause questionable-1 case
- Measles-1 case

Hemorrhage: ‡is considered a negli
‡‡is a moderate amou
‡‡‡is a moderately prof
and ligatures.
‡‡‡‡is frank profuse hemo

Tracheo-bronchial content:
‡is a thin film of bloo
‡‡is a fair amount but
‡‡‡is an amount of blo
and fairly fill the st

n Tracheo-Bronchial Content and the Influencing Factors, wi

ration Min.	Depression Hyoid Bone	Hemorrhage Amount	Suction	Laryngeal Reflex	Vomiting	Larynx	Conten Trache
6	No	‡ ‡ ‡	Not constantly applied	No	No	Clean	Clean
11	No	‡ ‡ ‡	Not constantly applied	No	After	Clean	Clean
9	No	‡ ‡	Not constantly applied	No	No	Clean	Clean
9	No	‡ ‡	Not constantly applied	No	After	Clean	Clean
7	No	‡	Constantly applied	Toward end	No	Clean	Clean
6	No	‡	Not constantly applied	No	No	Clean	Clean
8	No	‡ ‡ ‡	Constantly applied	No	No	Clean	Clean
11	No	‡ ‡	Constantly applied	No	After	Clean	Clean
10	No	‡ ‡ ‡	Constantly applied	No	After	Clean	Clean
10	No	‡ ‡ ‡	Constantly applied	No	No	Clean	Clean
8	No	‡ ‡	Not constantly applied	Toward end	No	Clean	Clean
7	No	‡	Constantly applied	No	No	Clean	Clean
9	Yes	‡ ‡	Constantly applied	No	No	Clean	Clean
9	Yes	‡ ‡	Constantly applied	No	No	Clean	Clean
8	No	‡ ‡	Constantly applied	No	After	Clean	Clean
7	No	‡ ‡ ‡	Not constantly applied	No	No	Clean	Clean
7	No	‡ ‡	Constantly applied	Toward end	No	Clean	Clean
8	Yes	‡ ‡ ‡	Not constantly applied	Toward end	After	Clean	Clean
8	No	‡ ‡ ‡	Constantly applied	Toward end	After	Clean	Clean
10	No	‡ ‡ ‡	Constantly applied	Toward end	After	Clean	Clean
14	No	‡ ‡ ‡	Not constantly applied	No	No	Clean	Clean

on
- Yes -3 cases
- one: No -18 cases

age
- ‡ -3 cases
- ‡ ‡ -9 cases
- ‡ ‡ ‡ -9 cases
- ‡ ‡ ‡ ‡ -0 cases

- Constantly applied -12 cases
- Not constantly applied -9 cases

Laryngeal Reflex
- Yes -0
- No -15

Vomiting
- Toward end -6
- After -8 cases
- No -13 cases

Follow up Report
- Cough for few d
- Measles
- No untoward seq

3	8	Shallow	Sl.	Arr.	11	No	‡ ‡ ‡	Not constantly applied
2½	9	Not shallow	Sl.	Arr.	9	Yes	‡ ‡ ‡	Not constantly applied
3	15	Shallow	Sl.	Arr.	11	No	‡ ‡ ‡	Not constantly applied

Note: In cases 10, 11, and 12 the head was at the same level as the rest of the body. In the remainin
rest of the body. In these same cases the electric suction apparatus was used: in the remaining ninety-seve

er 9.58 min.
ation 9.48 min.
-41 cases

low-59 cases
rrowsmith-80 cases
)emarest -13 cases
)ouglass -7 cases
ases
ases
-3 cases
-33 cases
-57 cases
-7 cases

Suction
- Constantly applied -26 cases
- Not constantly applied-74 cases

Laryngeal Reflex
- Yes -22 cases (present)
- No -51 cases (absent)
- Toward end -27 cases

Vomiting
- After-38 cases
- No-62 cases

Follow up Report
- Cough for few days-13 cases
- No untoward sequel-82 cases
- Septicemia-1 case
- Double talipes equino varus-1 case
- Not found- 1 case
- Death-cause questionable-1 case
- Measles-1 case

II—Showing Those Cases with a Clean Tracheo-Bronchial Content an

Anesthesia Ether Ozs.	Induction Min.	Respiration	Type	Operation	Duration Min.	Depression Hyoid Bone	Hemorrhage Amount	Suction
2	7	Shallow	Sluder	Douglass	6	No	‡ ‡	Not constantly applied
1½	5½	Shallow	Sl.	Demarest	11	No	‡ ‡ ‡	Not constantly applied
2½	8	Shallow	Sl.	Arrowsmith	9	No	‡ ‡	Not constantly applied
2½	9½	Shallow	Sl.	Arr.	9	No	‡ ‡	Not constantly applied
2	7	Not shallow	Sl.	Dem.	7	No	‡	Constantly applied
1¼	8	Shallow	Sl.	Arr.	6	No	‡	Not constantly applied
2	10	Shallow	Sl.	Arr.	8	No	‡ ‡ ‡	Constantly applied
1½	8	Shallow	Sl.	Arr.	11	No	‡ ‡	Constantly applied
1½	8	Shallow	Sl.	Arr.	10	No	‡ ‡ ‡	Constantly applied
1½	8	Shallow	Sl.	Arr.	10	No	‡ ‡ ‡	Constantly applied
1½	5	Not shallow	Sl.	Arr.	8	No	‡ ‡	Not constantly applied
2	15	Shallow	Sl.	Arr.	7	No	‡	Constantly applied
2	13	Shallow	Sl.	Arr.	9	Yes	‡ ‡	Constantly applied
2	15	Shallow	Sl.	Arr.	9	Yes	‡ ‡	Constantly applied
2	13	Shallow	Sl.	Arr.	8	No	‡ ‡	Constantly applied
1½	7	Shallow	Sl.	Arr.	7	No	‡ ‡ ‡	Not constantly applied
1½	8	Shallow	Sl.	Arr.	7	No	‡ ‡	Constantly applied
2	8	Shallow	Sl.	Arr.	8	Yes	‡ ‡ ‡	Not constantly applied
2	8	Shallow	Sl.	Arr.	8	No	‡ ‡ ‡	Constantly applied
2	6	Shallow	Sl.	Arr.	10	No	‡ ‡ ‡	Constantly applied
3½	27	Shallow	Sl.	Arr.	14	No	‡ ‡ ‡	Not constantly applied

her 9.7 min.
ration 9.1 min.
-19 cases

llow-2 cases
Arrowsmith-18 cases
Demarest -2 cases
Douglass -1 case

Depression Hyoid Bone
- Yes -3 cases
- No -18 cases

Hemorrhage
- ‡ -3 cases
- ‡ ‡ -9 cases
- ‡ ‡ ‡ -9 cases
- ‡ ‡ ‡ ‡ -0 cases

Suction
- Constantly applied -12 cases
- Not constantly applied -9 cases

ntly applied	Toward end	After	‡	‡	‡	‡	No untoward sequel
ntly applied	Toward end	After	‡	‡	‡	‡	No untoward sequel
ntly applied	No	No	‡	‡	‡	‡	No untoward sequel

he remaining cases the head was lowered 45 degrees from the
ninety-seven (97) the water suction apparatus was used.

Hemorrhage: ‡is considered a negligible quantity.
‡‡is a moderate amount not exceeding two ounces.
‡‡‡is a moderately profuse but not requiring the use of hemostats and ligatures.
‡‡‡‡is frank profuse hemorrhage requiring energetic measures for control.

Tracheo-bronchial content:
‡is a thin film of blood on the posterior wall.
‡‡is a fair amount but not obstructing the view of the lumen.
‡‡‡is an amount of blood sufficient to obstruct the view of the lumen and fairly fill the structure under consideration.

tent and the Influencing Factors, with Follow-up Notes.

uction	Laryngeal Reflex	Vomiting	Contents Larynx	Trachea	Rt. Bronch.	Lft. Bronch.	Follow up report
ntly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
y applied	Toward end	No	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	Toward end	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	No	After	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel
y applied	Toward end	No	Clean	Clean	Clean	Clean	Developed measles few days after leaving hospital.
ntly applied	Toward end	After	Clean	Clean	Clean	Clean	No untoward sequel
y applied	Toward end	After	Clean	Clean	Clean	Clean	Cough and temperature few days p. op.
y applied	Toward end	After	Clean	Clean	Clean	Clean	No untoward sequel
ntly applied	No	No	Clean	Clean	Clean	Clean	No untoward sequel

Laryngeal	Yes	-0 cases
	No	-15 cases
Reflex	Toward end	-6 cases
Vomiting	After	-8 cases
	No	-13 cases
Follow up Report	Cough for few days	-1 case
	Measles	-1 case
	No untoward sequel	-19 cases

result is that the patient generally becomes cyanotic, because of the increase of carbon dioxide in the blood. This increase stimulates the medulla, so that when the pressure from the mouth gag, tongue depressor, or instrument is removed, there is a sudden deep, forceful inspiratory effort which not only sucks in what blood may be near the glottis, but also aspirates blood and other content from anywhere in the naso-pharynx. This has been observed several times with the laryngeal speculum in place. In considering this factor it might be well to call to mind that foreign bodies in the air passages usually get there as the result of a sudden unexpected inspiratory effort on the part of the individual. If this is true in a wide awake individual, how much more is this possible when the subject is under the influence of an anesthetic and is either dazed or unconscious; and when the operation has furnished a substance that is even better placed and more motile than the foreign body that is usually aspirated.

The presence of the laryngeal reflex requires anesthesia which is so light as to necessitate rapid handling of the patient. Here the muscle tone is preserved, there is more bleeding, and the patient is very apt to struggle. So that the entire procedure is very liable to become a bad mess. A light anesthesia favors strong respiratory movements and an increased pharyngeal content. There is greater difficulty in manipulating the instruments and a greater possibility of aspiration. The presence of the laryngeal reflex, as this study has proven, is by no means a safeguard against the aspiration of blood, for in practically all the cases which showed a tracheo-bronchial tree free from blood the laryngeal reflex was absent during the entire operative procedure or a greater part of it.

Suction is now regarded as such an essential in tonsillectomy that it was used in all the cases. In 3 cases the Yankauer electric suction apparatus was used. In the remaining cases a water suction apparatus patterned after the Brawley and made at the hospital was employed. This is much more powerful and more dependable than any electric apparatus in its action. The suction tube was kept in place as persistently and continuously as the conditions of the operation and the size of the tube would permit, and suction was not abandoned until the throat was perfectly dry. Suction was charted as constantly applied and not constantly applied. In 26 cases suction was constantly applied, in the remaining cases suction was not constantly applied, because the suction tubes available were too large to be kept in the throat throughout the operation.

Hemorrhage was charted as one, two, three and four plus. One plus was considered a negligible quantity; two plus a moderate

amount not exceeding two ounces. Three plus was considered moderately profuse, but not requiring the use of hemostats and ligatures. Four plus was frank profuse hemorrhage which required energetic measures for control.

Analysis of Hemorrhage. One plus, 3; two plus, 33; three plus, 57; four plus, 7.

In 22 cases the laryngeal reflex was present at the commencement of the operation. In 51 cases the laryngeal reflex was absent throughout the operation. In 27 cases this reflex was re-established toward the end of the operation. In no cases was there vomiting during the induction of anesthesia or during the operation. According to the nurses' charts 38 patients vomited after operation, when they were more or less awake.

The content of each element of the tracheo-bronchial tree was charted as one plus, two plus and three plus. One plus represented a thin film of blood on the posterior wall; two plus a fair amount, but not obstructing the view of the lumen; three plus an amount of blood sufficient to obstruct the view of the lumen and fairly filling the structure under consideration.

SUMMARY OF TRACHEO-BRONCHIAL CONTENT.

	Larynx	Trachea	Right Bronchus	Left Bronchus
21 cases	clean throughout			
9 cases	1 plus throughout			
5 cases	clean	clean	1 plus	1 plus
3 cases	clean	1 plus	1 plus	1 plus
1 case	clean	2 plus	2 plus	2 plus
1 case	1 plus	clean	1 plus	1 plus
2 cases	1 plus	2 plus	2 plus	2 plus
38 cases	1 plus	2 plus	2 plus	2 plus
2 cases	1 plus	2 plus	3 plus	3 plus
1 case	2 plus	2 plus	3 plus	3 plus
17 cases	2 plus	3 plus	3 plus	3 plus

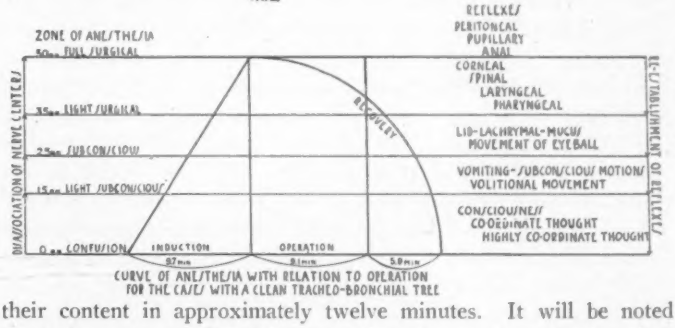
100

In 5 cases the trachea was clean, while each main bronchus showed a 1 plus content. The blood on aspiration drops down to the depths of the tracheo-bronchial tree and then slowly works its way up again. This may be construed as evidence of the suction force of the inspiratory effort. This phenomenon was observed where but a very small quantity of blood had been aspirated, a quantity sufficient only to cover thinly the posterior walls. The gradual movement upward of the aspirated fluid has been observed

in the same trachea in which at short intervals the blood was seen to be at different higher levels.

When there was blood present in the trachea, direct observation of the upper trachea and glottis disclosed a peculiar rolling motion on the part of the body of fluid which seemed to be interrupted only by the closure of the glottis. This flow of blood over the inter-arytenoid space seemed to be dependent upon a uniform steady propulsion force. Whether the peristaltic wave of the trachea and bronchi called to our attention by Bullowa[16] and Gottlieb[17] in their work on tracheo-bronchial function in dogs, is the main factor here or whether it is the ciliated mucous membrane is difficult to determine. Probably a combination of these factors is responsible for this phenomenon. In connection with this phase of the tracheo-bronchial content, the writer's few observations lead to the conclusion that the trachea and bronchi empty themselves of

FIG. II



their content in approximately twelve minutes. It will be noted from the summary that the laryngeal content was usually less than that of the trachea or bronchus.

An analysis of the above cases in which there was no blood in the tracheo-bronchial tree shows that the average age was 7.9 years, the average amount of ether used was 1.9 ounces, the average period of induction of anesthesia 9.7 minutes; in 19 cases the respirations were shallow, while in 2 cases they were not shallow; the average duration of operation was 9.1 minutes. In 2 cases the hyoid bone was depressed (slightly), while in the other 19 cases there was no depression of the hyoid bone; 3 cases showed 1 plus hemorrhage, 9a 2 plus hemorrhage and 9a 3 plus hemorrhage. The laryngeal reflex was present in none of these cases at the beginning, it was entirely absent in 15 and was re-established toward the end of the operation in 6 cases. Suction was constantly applied in 12, and not constantly applied in 9 of these cases. The follow-up reports for these cases showed:

Cough for a few days, 1; measles, 1; no untoward sequel, 19.

The following diagram would serve to demonstrate the type and duration of anesthesia in its relation to the operation for those cases which showed no tracheo-bronchial content.

The reports of our social service staff who visited the home of each patient three weeks or more after the time of operation are of interest. Information was obtained concerning the patient's general condition with special reference to the respiratory tract.

Follow-up Report:

Cough for a few days	13
No untoward sequel	82
Septicemia	1
Double talipes equino varus	1
Not found	1
Measles	1
Death	1

The following three cases deserve special mention:

Case 24. A. K., male, age 10, was admitted to the hospital January 19, 1922, for the express purpose of having a tonsillectomy performed. His family history was negative and, according to his previous personal history, he had always been very well. He was operated upon the day after admission after his general physical condition had been found good. The operation record shows that 2 ounces of ether were used during the induction of anesthesia which consumed 8 minutes. The respirations during operation were recorded as not shallow. The Sluder Demarest instrument was used, the operation was performed in 7 minutes; the depression of the hyoid bone was noticed during the operation, the hemorrhage was 2 plus and suction was not constantly applied. The laryngeal reflex was absent during the entire operation. The patient did not vomit during or after the operation. His larynx had a 1 plus content, and the trachea and each bronchus a 2 plus content. The child was discharged about thirty hours after operation with a temperature and pulse of normal range. The mother states that she took her boy home while a heavy rain was falling and the child complained of having been chilled during the long walk and trolley ride home. The first evidence of illness come on the evening of the 22nd, about sixty hours after operation, when the child was feverish, according to his parent. The fever continued with no other subjective complaint until the afternoon of the 25th, five days after the operation; the family physician was called in because the boy had had two convulsions. He gave as his opinion that the child was suffering

from an acute meningitis and advised removal to a hospital. An ambulance was accordingly summoned and the boy taken to a hospital other than ours. He was admitted to the hospital January 25 at 3:30 p. m., and died the following morning at 5:25. The admission temperature was 102.6. The physical examination made at the hospital a few hours before death revealed the following facts: It is a poorly nourished boy of ten, acutely ill, breathing rapidly and with difficulty. There is a dilatation of the alae nasi and an expiratory grunt is heard. The child is cyanotic. The postauricular glands are enlarged. There is no rigidity, but the neck is very painful on motion. The heart sounds are feeble and distant. The lungs show no evidence of bronchial breathing; there are many moist sibilant and sonorous rales throughout the chest. There are crackling rales at the right apex which are also heard in the left lower posterior chest. Breath sounds are diminished at the right base. The abdomen is rigid and tender. The extremities are negative. The blood count was white blood cells, 19800; polys, 87 per cent. The child died fifteen hours after admission. The diagnosis was septic broncho-pneumonia. The origin of the infection in this case is of importance. Did the boy receive it on the operating table, in the ward after operation or on his way home in the cold, rainy weather? His first signs of illness came sixty hours after operation, thirty hours after leaving the ward. It is the opinion of the writer that the chilling of this boy whose resistance had been lowered by the operation, during his trip home was the main contributing cause to his overwhelming infection; that the operative field probably furnished the avenue of entrance for some virulent organism.

Case 20. H. H., age 10, was operated upon through an oversight, almost immediately after he had recovered from an acute follicular tonsillitis. He ran a typical septicemic course for three weeks and was confined to his bed for several weeks as a result of this unfortunate mistake.

Case 45. J. C., age 8, showed an unusual complication immediately after operation. His lower extremities, which had both been normal before operation, showed a double talipes equino varus, an adduction of the foot on either side. This lasted for a little more than twenty-four hours and passed away, leaving the boy with his former good extremities. During the time of this deformity the child suffered severe pain.

It might be of value to briefly state the bearing of each factor mentioned upon the tracheo-bronchial content.

Age. There is no doubt that, all things being equal, the younger patient has less chance of getting blood into his trachea and bronchi.

Children usually bleed less, and their inspiratory effort is not so powerful. They are easier to handle when anesthetized.

Preoperative Condition. Patients should be properly prepared for an operation. Some form of catharsis the day before and nothing by mouth the morning of the operation should be insisted upon. There is no justification for operating upon a patient immediately after an acute illness. Any semblance of a generally poor physical condition should be a contraindication for operation and the patient should be given an opportunity to improve his health before operation is undertaken. A weakened individual has a less effective expulsion apparatus in his chest.

Position of Patient. Any position which will keep the blood as far away from the glottis as possible is an advantage. When the head is lower than the rest of the body, the blood will gravitate to the nasopharynx and therefore away from the glottis.

Operation—Type, Duration. Any operation that does not consume an excessive amount of time and does not cause unnecessary trauma with its consequent hemorrhage is indicated. Therefore any one of the numerous Sluder modifications or any type of dissection, if performed dexterously is acceptable. The more rapid the operation the less is the liability of interference with respiration and the less is the liability of the accumulation of blood.

Depression of Hyoid Bone. Depression of the hyoid bone must be avoided. When the hyoid bone is by chance depressed at the time of delivery of the tonsil into the guillotine, or other instrument, the tonsil should not be removed until the respirations have returned to their former rate and depth, when there will be less likelihood of aspiration of blood as a result of this maneuver. The mouth gag, the tongue depressor and the instrument must always be watched.

Amount of Ether—Period of Induction. The amount of ether used to induce anesthesia and the time required for its induction are only of importance in that a sufficient quantity of ether must be used and sufficient time allowed to produce the depth of anesthesia desired in this work. These two factors are dependent upon the individual anesthetist; if the ether is given very slowly a good deal of it is lost and time and anesthetic are unnecessarily consumed. A capable anesthetist is the best solution of this problem.

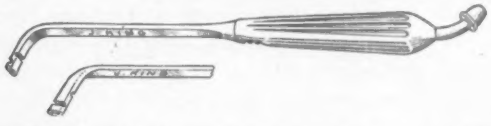
Hemorrhage. If the hemorrhage is such that the blood accumulates faster than the suction apparatus can carry it off, it is bound by its own pressure and volume to enter the tracheo-bronchial tree. Excessive hemorrhage insures a tracheo-bronchial content.

Laryngeal Reflex—Depth of Anesthesia—Type of Respiration. The absence of the laryngeal reflex would seem to be desirable. It

was noticed that when the laryngeal reflex was present the relaxation was poor, the anesthesia incomplete, and the respirations were more forceful. Almost invariably the tracheo-bronchial tree contained some blood in the presence of laryngeal reflex. The influence of this factor has been mentioned before.

A moderately deep anesthesia was found to give the ideal type of respiration. A smooth, even, regular, shallow respiration is the ideal for tonsillectomy. This does not necessarily require that the anesthetic be continued throughout the operation, but it would seem to indicate that a well qualified anesthetist is an advantage.

Suction. Strong, uninterrupted suction, continuously applied, is essential. The suction tube must be so placed in the pharynx that it will extract the accumulating blood and prevent it from getting down to the glottic region. A suction tube which could be so employed would be of great advantage to this work. It can be stated that a good many more cases would have shown a clean tracheo-bronchial tree if a suction tube that could be so used in all cases



were available immediately after this study. A suction tube was devised by the writer whose stem would be thin enough to pass around the tonsillectome and thus kept in place in the pharynx throughout the operation. The caliber of the tube was designed to be of sufficient size to carry off the accumulating blood in the pharyngeal cavity. As far as can be ascertained there is not at present a suction tube of this type available.

Vomiting. Vomiting during induction of anesthesia or during the operation is a menace and places in the region of the glottis matter which can be readily aspirated. Vomiting after the operation when the patient is more or less awake is of course not so much to be feared. Proper attention to the patient's preparation for operation and properly induced anesthesia will usually prevent vomiting during operation.

Aspiration: If, in a series of one hundred, we have seventy-nine patients who aspirated blood and pharyngeal content in varying quantity, with one death, the cause of which is questionable, there must be some explanation for the absence of pulmonary disease in all these cases. There is no doubt as to whether the blood actually penetrates to the alveoli in a majority of cases. Surely those with

a two plus and three plus bronchial content have blood in their alveoli. It must be, therefore, that the expulsion apparatus of the chest of the individual explains the freedom from pulmonary complications in these cases. Therefore, it would follow, that a poor expulsion apparatus would delay the final removal of the potentially infective material and thus favor pulmonary disease.

CONCLUSIONS.

1. Even with the observation of every precaution that could be thought of by the writer, a certain percentage of tonsillectomy patients operated upon under general anesthesia, will show blood in the tracheo-bronchial tree.

2. In one hundred tonsillectomies under general anesthesia, with more than an ordinary amount of care, seventy-nine showed blood in varying quantity in the tracheo-bronchial tree.

3. Of the seventy-nine cases which showed blood in the trachea and bronchi, one died.

4. The preoperative condition of the patient should be carefully considered, both from the standpoint of recent acute illness, and from the standpoint of the individual's respiratory expulsion effort after operation. One patient developed a septicemia as a result of an oversight which permitted his being operated upon shortly after an acute tonsillitis.

5. The head placed in the Rose position or the head of the table dropped to an angle of forty-five degrees, are the positions of choice.

6. The absence of the laryngeal reflex seems to afford proper conditions of respiration and relaxation for the operation.

7. A moderately complete anesthesia is the anesthesia of choice.

8. Respiration of a smooth, even, steady, shallow type is essential.

9. Depression of the hyoid bone must be avoided.

10. Constantly applied suction should be used throughout the operation and the suction tube not withdrawn until the pharynx is dry.

11. A minimum of hemorrhage is obviously desirable.

12. The patient should be kept on the table until he has reacted fairly well.

13. Vomiting during the induction of anesthesia or during the operation is to be prevented.

14. The pulmonary tract empties itself of its blood content in approximately twelve to fifteen minutes.

15. The production of pathology in the lung tissue or bronchial tree would seem to be dependent upon the expulsive force of the individual's respiratory apparatus.

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184 Clinton Street, Brooklyn, N. Y.

SOME PHYSICAL INTRA-NASAL CONDITIONS FAVORING INVOLVEMENT OF THE NASAL ACCESSORY SINUSES.*

DR. MYRON METZENBAUM, Cleveland.

1. An infection may be carried by the blood stream to a sinus.

2. The antrum is often directly infected by the root of a carrious tooth.

3. Just as the forcing of nasal secretion up the Eustachian tube may be accompanied by an acute ear pain resulting in an otitis media, so the forcible blowing of the nose may be accompanied by an acute pain in the region of the frontal sinus or antrum, which pain may not entirely subside for two or three days or until there is a spontaneous flow of muco-purulent secretion from the infected sinus or until the sinus is opened.

4. During some of the recent epidemics, the mucous membranes of the lungs were especially involved and those of the head and sinuses remained relatively immune. While during the other more recent epidemics, the mucous membranes of the head and especially those of the sinuses, were involved so frequently, that it seemed as though the air, which ventilated the sinuses, carried an infection directly to them.

There are many other ways in which the sinuses may become involved. There are also physical factors which favor sinus involvement; of the many physical factors I wish to point out four, which are generally recognized, but which are not often corrected, unless there are other conditions of the nares demanding surgical interference.

These physical intra-nasal conditions are factors directing the flow of the nasal secretions from the frontal toward the ethmoid and antrum, and from the antrum upward toward the ethmoids and frontal.

1. A superior, posterior deflection of the septum.

2. A bullus middle turbinate, usually accompanied by polypaid degeneration.

3. A middle turbinate, normal in size, close to the sinus wall.

4. A shelf-like inferior turbinate, lying across the nares.

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*Read before the Ear, Nose and Throat Section of the Ohio State Medical Meeting, Cincinnati, May 3, 1922. By consent of the editor, this paper appears simultaneously in The Laryngoscope and the Ohio State Medical Journal.

1. The anterior, and all of the lower portion of the septum may be relatively straight, but superiorly and posteriorly it may be convexed to such a degree, as to virtually hide the middle turbinate. After shrinking the nasal tissues with cocain-adrenalin, the middle turbinate can be viewed only through a narrow slit. Such a deflection of the septum may force the middle turbinate quite firmly against the sinus wall, and while

Fig. 1.—Model "A"; a, superior turbinate; b, agger nasi; c, depression above c, superior meatus; d, middle turbinate; e, depression above e, middle meatus; f, inferior turbinate; g, depression above g, inferior meatus; h, frontal sinus; i, ethmoidal cell; j, Eustachian orifice; k, sphenoidal sinus.

there may be no interference with the ventilation and the drainage of the sinuses, when the nose is in a normal condition, as soon as this individual develops a nasal cold, he will experience in a lesser or greater degree a sense of fullness, pressure or pain in the region of the frontal and ethmoid sinuses. This may result from an engorgement of the mucous membranes of the surrounding tissues and the middle turbinate and the pressure

they exert upon each other. The bulging septum will restrict the engorged middle turbinate from expanding and will often force it so tightly against the sinus wall, that an application of cocaine and adrenalin will not cause sufficient shrinkage to permit the passage of a probe between the sinus wall and the middle turbinate, where the ostia of the frontal anterior and posterior ethmoids and antrum lie. During periods of conges-

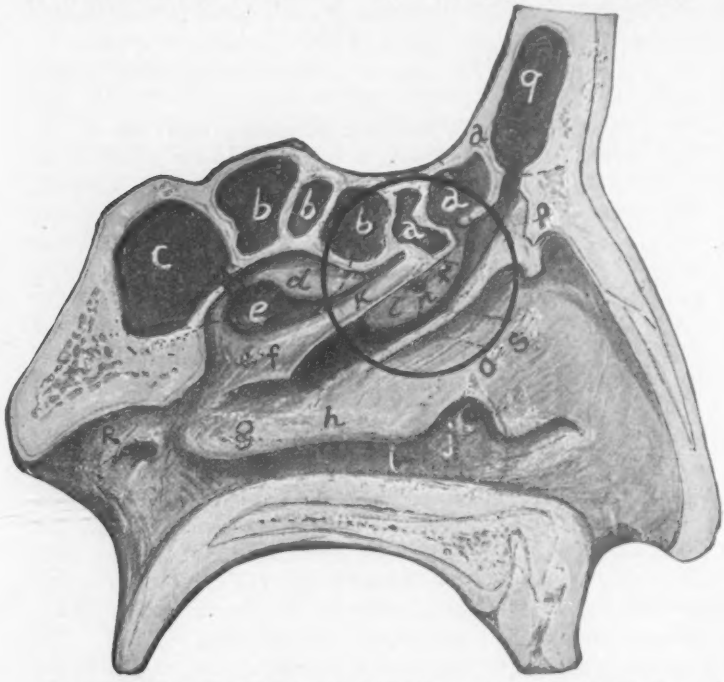


Fig. 2.—Model "B": a, a, anterior ethmoidal cells; b, b, b, posterior ethmoidal cells; c, sphenoidal sinus; d, superior turbinate; e, depression above e, recessus sphenoidalis; f, middle turbinate; g, space above g, middle meatus; h, inferior turbinate; i, inferior meatus; j, lacrimal duct; k, depression below k, maxillary ostium; l, bulla ethmoidalis; m, opening posterior to m, ostium of bulla ethmoidalis; n, depression below n, hiatus semilunaris; o, ring vicous circle; p, depression posterior to p, frontonasal duct; q, frontal sinus; r, Eustachian orifice; s, ridge posterior to s, processus uncinatus.

tion and inflammation of the nares, this proximity of the middle turbinate, with the region of the sinus ostium must interfere with the normal ventilation and drainage of one or more of the sinuses. The markedly convex septum in the region of the middle turbinate favors the retention of mucous in the

middle meatus. This retained secretion by its pressure irritates the mucous membrane, resulting in a hypertrophy. The mucous may be retained in such quantities as to fill the middle meatus and cover the ostium. The mucous is often of such consistency and in such quantities as to give the appearance of polyps and can only be removed from the middle meatus after considerable effort.

A superior-posterior deflection of the septum in combination with deflections in other portions of the septum or when existing alone should be corrected by a submucous resection operation.

2. The bulla middle turbinate is usually made up of one large bulla cell, covered with a hypertrophied mucous membrane, portions of wihch have undergone polypoid degeneration. Such a massive middle turbinate will crowd the middle meatus so tightly that cocain-adrenalin is not effective in shrinkit sufficiently to establish but a slight separation between it and the sinus wall. After such a turbinate is exenterated there can often be seen a smooth, slightly concave surface where it pressed against the sinus wall. Such a massive middle turbinate and those of lesser size, by their location, during periods of nasal congestion and colds, interfere with the ventilation and drainage of one or several of the nasal accessory sinuses, as is evidenced by the fullness, sensitiveness and pain in the sinus region. The removal of the anterior polypoid portion of the middle turbinate establishes a better sinus ventilation and drainage, but leaves part of the bulla cell. This remaining mass may keep up a rather foul secretion. Since the bullus polypoid degenerated middle turbinate has lost most of its function, the exenteration in its entirety removes all that is pathological from the sinus region.

3. A middle turbinate may be normal in size, may even be somewhat smaller than normal, but may lie so firmly against the sinus wall that after the application of cocain and adrenalin, a probe cannot be passed between the middle turbinate and the outer nasal wall. These patients have a rather constant sense of pressure and often neuralgic pains in the area of the ethmoid cells and during periods of nasal congestion and head colds this feeling of pressure is changed to one of pain. The very close proximity of such a middle turbinate to the sinuses will readily interfere with their normal ventilation and drainage. The treatment for this condition is simple. After cocainization, any straight instrument or strong applicator is passed

between the edge of the middle turbinate, or further back, if possible, and the outer wall. The middle turbinate is then fractured a sixteenth of an inch toward the median line. A small piece of cotton or gauze is inserted between the turbinate and the outer wall and is removed next day. After this, the middle turbinate will never again lie as rigidly against the outer wall. This simple procedure often gives instant relief to chronic pressure pains. It insures thereafter better ventilation and drainage to the sinuses in this region, during periods of nasal congestion and colds.

4. The inferior turbinate may project from the antral wall toward the septum and form a shelf on which the mucous will build up in such quantities as to fill the middle meatus with a tenaceous mucous, difficult to remove and often resembling polyps. This tenaceous mucous may fill the middle meatus so completely that it covers some of the sinus openings. The constant presence of the mucous results in the hypertrophy of the inferior turbinate. The corrective procedure, here, is just the opposite to that applied to the rigid middle turbinate. After cocainization the inferior turbinate is fractured against the antral wall and with gauze packing held there for 24 hours, after which time the inferior turbinate remains closer to the outer wall than before. The mucous, having no shelf to rest upon, will lessen in a relatively short time. This procedure of fracturing either middle or inferior turbinate is simple as compared to the exenteration or the removal of any portion and in no way does it interfere with their function. On the contrary, it is possible for them to functionate better than before. The middle turbinate, because it has sufficient room, and the inferior turbinate, because it is not constantly bathed in mucous.

The foregoing are conservative procedures for the correction of physical factors which may interfere with the ventilation and drainage of one or more of the accessory nasal sinuses during periods of nasal congestion or colds. This interference with the ventilation and drainage of the sinuses may result in a catarrhal or purulent sinusitis.

A BRONCHOSCOPIC TACK-AND-PIN FORCEPS.

DR. GABRIEL TUCKER, Philadelphia.

In the bronchoscopic removal of a foreign body, there is a definite mechanical problem which should be given careful study and a systematic procedure evolved in each case before the bronchoscope is passed on the patient. Preliminary study should include a consideration of the following points:

1. Exact localization of the foreign body by physical examination and expert Roentgen ray study.

2. The anatomical structure at the point of lodgment of the foreign body should be considered so that the proper presentation, application of forceps and direction for application of manipulative movement can be determined.

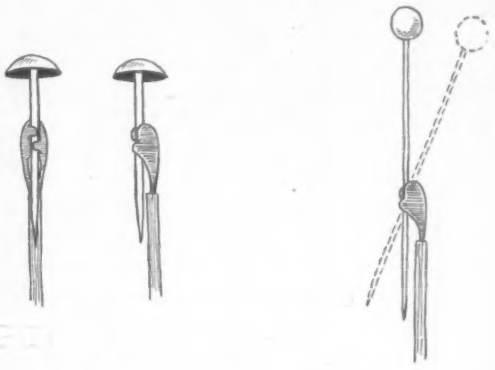
3. The foreign body, its composition, shape, size and the direction of its point or points should be considered. The history and Roentgen ray study will give this information in the majority of cases; and, in addition, when possible an exact duplicate of the foreign body should be obtained for study and preliminary practice on the rubber tube manikin.

4. The instrumentarium for the particular patient and the particular type of foreign body must be decided upon. The size bronchoscope suitable for the anatomy of the patient, forceps of the correct size and length for the bronchoscope used and of the correct type for the particular foreign body must be selected. A special type of forceps suitable to the particular mechanical problem may be required.

If time is taken for careful preliminary study and preparation in every case, and the bronchoscopist will give sufficient time to the acquiring of proper skill and technic, the percentage of morbidity and mortality in foreign body bronchoscopy will be very much lower and the percentage of successful foreign body removals will be very much higher than the present rate.

In the experimental studies of bronchoscopic mechanical problems working on the rubber tube manikin, cadaver and narcotized living dog at the Graduate School of Medicine of the University of Pennsylvania, I have devised a special forceps for the bronchoscopic removal of tacks, pins and safety pins that have proven exceptionally useful in solving the problems presented by this type of foreign body.

The lodgment of tacks, pins and safety pins in the lower air passages and esophagus is of very frequent occurrence. The position in which they are found is usually point upward, the tack or pin going down head first, the safety pin spring end first. The foreign body descends to a location where the lumen of the invaded bronchus engages it. The point projecting upward very seldom remains free. The invaded anatomy is not rigid and immobile, like a gas pipe. In the trachea and bronchi the bechic, respiratory and pulsitory movements tend to bury the point. In the esophagus the peristaltic and anti-peristaltic movements tend to imbed the point. Previous manipulative efforts may have embedded the point in the wall of the esophagus or bronchus. It is quite easy in the esophagus to push



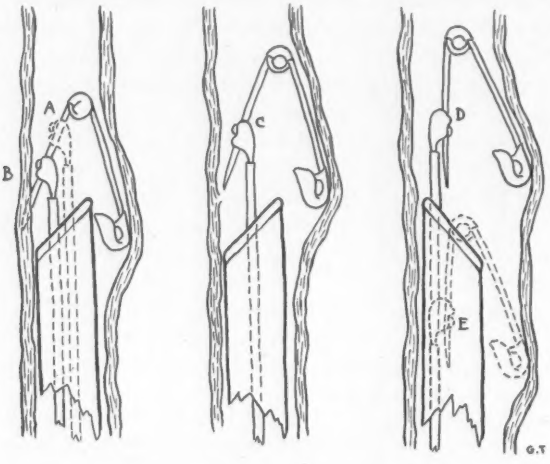
a mucosal fold over the point as the tube approaches the foreign body. Hence the bronchoscopic precept, "Find the point of a pointed foreign body and cover it before any attempt at withdrawal is made."

Withdrawal of a tack or pin lodged in the bronchus or mediastinal esophagus, with the point upwards and embedded in the mucosa without first freeing the point means perforation into the mediastinum, possible hemorrhage, mediastinal emphysema, mediastinitis and a very high mortality rate, with very often failure of removal as well. To use sufficient force to tear it out is unjustifiable and often mechanically impossible.

Chevalier Jackson's method of dealing with this mechanical problem is to disembed the point by inward rotation, first pushing it downward and as the point becomes free, turning it into the tube mouth. The point being thus protected, withdrawal

is accomplished without trauma. The side-curved forceps were originally used for this manipulation, but it was found that after freeing the point that there was a strong tendency for the shaft of the pin or tack to get out of the grasp of the forceps, which meant that a new hold would have to be secured and possibly that the foreign body would go down to a deeper level. To prevent losing the grasp on the shaft and to aid in bringing the point into the tube mouth I have added to Dr. Jackson's side-curved forceps two small lips that when properly placed completely overcome this difficulty. (Fig. 1.)

The lips are placed on the projecting side of the forceps jaws, one on either jaw, one anterior to the other and each projecting



beyond the grasping surface of the jaw to which it is attached in such a position that with the forceps closed each lip passes its fellow on the opposite jaw. The lips are made rounded and smooth and a small space is allowed between them so that they will not bite or injure the mucosa.

In using the forceps the foreign body is carefully approached with the bronchoscope and the shaft of the pin or tack where it penetrates the mucosa is brought into view. The shaft is then grasped very lightly in the bite of the forceps, the lips overlapping so that the forceps can be slid along the shaft (Fig. 2, a) until the lip comes in contact with the mucosa at the point of entrance of the shaft (Fig. 2, b). The forceps are

now closed firmly and the pin or tack is carried slightly farther into the anatomical lumen until the point is free and can be plainly seen in the bronchoscopic field (Fig. 2, c). The grasp is now slightly loosened and the handle of the forceps is rotated through an arc of 90 to 180 degrees, bringing the axis of the shaft of the pin parallel with the axis of the canula of forceps and the tube, the forceps canula is now between the point of the pin and the bronchial wall, the point in plain view (Fig. 2, d). The grasp is tightened and the point of the pin is drawn straight into the tube and so protected for withdrawal (Fig. 2, e). The further steps in Jackson's "inward rotation" method of removal are familiar to all endoscopists and do not need description.

In addition to the action of the lips in preventing the escape of the pin, these forceps, by reason of being made so that the back edge of the jaws come together first, have the tendency to throw the shaft of the pin parallel to the axis of the bronchoscope and to bring it back to parallelism if anything should cause it to deviate (Fig. 3).

The forceps are made in three lengths, 60 cm, 50 cm, and 45 cm, and in two weights, the 45 cm. being much lighter, so that it may be used through a 5 mm. bronchoscope. These forceps have been in use for the bronchoscopic and esophagoscopic extraction of tacks, pins and safety pins in the Bronchoscopic Clinics at the Jefferson and the University Hospitals during the past year and have proven very satisfactory.

2117 Chestnut Street.

INVESTIGATION OF THE NYSTAGMUS ARC IN A CASE OF CONGENITAL NYSTAGMUS.

DR. HARRIS H. VAIL, Cincinnati, Ohio.

The following case of congenital nystagmus is reported in view of the fact that, contrary to the usual rule in ocular nystagmus that the condition of the eye is responsible for the nystagmus, we find in this patient perfectly normal fundi and media with vision of 20/20 with correction. In other words this patient has normal eyes with a spontaneous nystagmus which is probably congenital and on account of this the Barany Rotation and Caloric reactions are reported.

Mr. J. E. V. 25, street car conductor. F. H. negative. P. H. Has had five attacks of mild iritis in past five years which seemed to follow a kick in left eye by a mule in 1914. Otherwise has good health. Wasserman negative. Gonococcus Fixation test negative.

P. I. Patient has had nystagmus for as long as he knows. Says he was born with it. Vision has remained good and he is continuing with his work without any discomforts. Patient consulted Dr. D. T. Vail for iritis and was referred to me for study of the congenital nystagmus.

Jan. 12, 1922: Examination showed no evidence of any intracranial or neurological lesion. Vision 20/20 both eyes with correction (Right +0.50 c. ax. 90; Left +1.0 D. sph. +0.50 c. ax. 90). Fundi normal. There is present a spontaneous nystagmus purely horizontal on looking to right, left, ahead, up and down. Amplitude greatest on looking to the right. On looking upward the spontaneous nystagmus is horizontal with quick component to the right. On looking down there is a very slight horizontal nystagmus with quick component to the right. On looking ahead the quick component is to the right. With testing of the eyes in all positions it was impossible to find any position where there was no spontaneous nystagmus.

No spontaneous past pointing.

On rotation to the right, head 30° forwards, the after-nystagmus was brisk, duration 45 seconds. Quick component to the left. It was extremely difficult to determine the end point on account of the spontaneous nystagmus present, so patient was again rotated to right and told to look to the right upon cessation of the rotation. With the eyes in this position, namely, looking to the right there was

no nystagmus for a period of 25 seconds. The after-vertigo was found to be of 10 seconds duration. Past pointing tests after right rotation showed deviation with right arm 24 inches to right, left arm touched. Upon repeating the test, testing the left arm first, it was found to past point to the right 8 inches and the right arm touched.

Upon rotation to the left with the head 30° forwards there was a brisk horizontal after-nystagmus with the quick component to the right lasting for 45 seconds. The end point as on right rotation was exceedingly difficult to obtain on account of the spontaneous nystagmus. Patient was again rotated to the left and upon cessation of rotation was told to look to the left which he did very well. There was no nystagmus for a period of 25 seconds. There was present, however, and patient was given three distinct examinations, a mixed horizontal and rotary rolling movement to and fro impossible to resolve into quick or slow components. It seemed as if this was a true ocular muscle osscillation. After-vertigo was found to be 10 seconds. Past pointing tests showed deviation of left arm 8 inches to the left and the right arm 2 inches to the left.

The caloric tests were then done, testing the left ear first. With the head 30° forward and water 69° F. after one minute the spontaneous horizontal nystagmus to the left stopped and by one minute and fifteen seconds there appeared a definite rotary nystagmus to the right. Vertigo was present by one minute and fifteen seconds. Past pointing tests showed deviation of about two inches to the left with both arms. With the head then 60° back there was a brisk horizontal after-nystagmus to the right on looking to the right and on looking to the left there was none. Past pointing tests showed a deviation of 2 inches to the left with both arms.

On douching the right ear with the head 30° forwards, after one minute and fifteen seconds there appeared a good rotary nystagmus with quick component to left. On looking to the right the nystagmus stopped. Vertigo was present after one minute and fifteen seconds. Past pointing was not tested.

On putting the head 60° backwards there was a brisk horizontal nystagmus to the left with vertigo. On looking to the right the nystagmus stopped. Past pointing was not tested.

SUMMARY.

In the case examined, namely, a patient with congenital nystagmus it was imposible to find a position of the eyes when there was no spontaneous nystagmus.

Following stimulation of the labyrinth by the rotation and caloric tests it was possible to stop absolutely the spontaneous nystagmus for a period of time depending of course on the duration of the stimulus.

In the case cited it was possible to stop the spontaneous nystagmus for a period of twenty-five seconds after right and left rotation.

After-vertigo on right and left rotation was diminshed.

Vertigo was normally present after stimulation of the vertical semicircular canals in the caloric test.

There was no evidence of any labyrinthine or eighth nerve lesion.

CONCLUSION.

The rotation and caloric tests showed that the nystagmus arc is intact.

An ocular cause of the spontaneous nystagmus can probably be ruled out.

In view of the absolutely normal neurological and general physical examinations and the fact that the patient has no symptoms suggesting any intracranial lesion it is quite possible that in this case we may be dealing with some congenital malformation or lesion of the vertigo pathways. Obviously, if there has been a lesion involving the vertigo pathways it must be in relation to the nystagmus arc in some fashion or other to give a marked spontaneous horizontal nystagmus. The fact that, apparently only the vertigo fibers from the horizontal canals are involved and that the spontaneous nystagmus is purely horizontal is interesting. Of course it is impossible to determine the site of the lesion and this case is reported only in view of the apparent absence of any ocular cause for spontaneous nystagmus and the fact that after-vertigo from horizontal canal stimulation was definitely decreased.

24 East Eighth Street.

INTRATRACHEAL ABSCESS.

Dr. C. Arbuthnot Campbell, Steubenville, Ohio.

The patient was seen in consultation with Dr. Harden of Wellsburg, W. Va., and presented interesting features.

Fr. P. W., an active farmer of 72 years. Well preserved. One parent died of tuberculosis many years ago, other ways family and personal history negative. About ten days previous to my visit his knee was injured but not to confine him to bed.

Five days previous to his present illness (Monday, February 20) he noticed some swelling of the neck below the chin, hot compresses were applied which gave relief and in a short time the condition disappeared. The cause of this swelling was unknown to patient and his attending physician, there was no abrasion on the face or neck to show cause of the infection, but the teeth were in a very bad condition there being carious teeth, old roots and pyorrhea from the gums.

Dr. Harden was called to the patient for the sudden dyspnea and dysphagia. A few hours later when I saw the patient, his condition was the same, and dyspnea led one to suspect obstructive breathing as laryngeal diptheria or retropharyngeal abscess. Respiration 32 a minute and of a whistling character. Fetid breath. Externally no evidence of an abnormal condition. The mouth, fauces and pharyngeal walls were negative, except for the teeth as noted above. Direct examination of the larynx showed negative epiglottis but marked oedema of the aryepglottic folds, this oedema obstructed the view of the interior of the larynx. Several punctures were made in the oedematous folds with relief to the patient; the dysphagia improved and the respiration decreased from 32 to 26, but the whistling like breathing continued. Four hours later the respiration was the same and the general condition of the patient was better but far from being good. Direct examination of the larynx showed the aryepiglottic folds slightly edematous but a good view of the interior of the larynx showed normal cords and immediately below them a large mass extending beyond the midline of the larynx the color was red and shaped like a half orange. As the patient lived some distance from a physician it was decided advisable to do a tracheotomy. Under local anesthesia high tracheotomy was done; immediately after passing thru the cartilage there was an escape of a brownish water like fluid with a penetrating stench. The tube was intraduced with

the further escape of this fluid the quantity draining being about two ounces, coughing and deep respirations brought forth more of the fluid both thru the tube and the incision. Air did NOT pass thru the tube, showing that the tube altho it was thru the cartilage of the trachea but beneath the mucosa. Immediately the respiration improved to twenty a minute and the general comfort of the patient was better. He died in thirty-six hours, apparently of exhaustion.

Comments: The case as a whole is obscure as a postmortem was not made. The etiology is in doubt, suspicion may rest upon the teeth; the swelling five days previous to the fatal attack situated in the tissues of the neck suggests Ludwigs angina; the character of the pus suggested retropharyngeal abscess. I am led to believe that the patient had an acute laryngeal and tracheal abscess beneath the mucosa extending from the aryepiglottic folds to an unknown distance down the trachea below the third ring.

TONSIL ENUCLEATOR.

Dr. David H. Jones, New York.

After examination of history cards of 4,520 patients at Manhattan Eye, Ear and Throat Hospital, who had been operated upon for removal of tonsils by the Sluder method and instrument, the writer found that there more pieces of tonsil left in lower pole, and while teaching tonsillectomy with the Sluder instrument, a searching inspection revealed the same fault.

Endeavoring to overcome this, the writer changed the shape of the Sluder fenestra from an oval to a parabola with a straight line as its base. He has used this modification in 1,350 cases, private and clinical, with excellent results.

The instrument is introduced with the point or angle down, using right instrument for patient's right tonsil, and left for patient's left tonsil, holding instrument vertically with handle to opposite side of mouth, and angle of instrument engages the lower pole of tonsil. The instrument is pressed firmly outward until edge of fenestra meets resistance of superior constrictor muscle and while handle is depressed, and held obliquely across the mouth the tonsil is dislocated upward and forward into soft palate, and held there. Pressure by finger or thumb is applied again at the anterior pillar and the tonsil is forced through fenestra. Blade is forced down slowly,

keeping instrument held firmly in position at angle of 45 degrees to mouth. Pass index finger along fenestra to make sure that no piece of tonsil remains, pushing upper end of anterior pillar backward and downward over end of fenestra, now with quick forcible pressure of both hands drive blade home.

To remove right tonsil, hook terminal phalanx of left index finger firmly over end of fenestra. Now with thumb pressing on point of chin, instrument being raised to vertical position in mouth and rotated downward, quickly to point of chin through angle of 90 degrees, and maintaining constant pressure on blade of instrument. The tonsil will be separated from its fossa.

This procedure is carried out in the same manner with left tonsil, using terminal phalanx of right index finger.

To perform clean tonsillectomies, the writer believes that the base of fenestra should be very thin and blades moderately sharp, as there is less chance of pillars and muscles being torn. Should a piece of upper pole remain it can be removed by using the angle of instrument of opposite side.

ADVANTAGES.

Base of fenestra being straight, tonsil can be dislocated from sinus tonsillaris easier and it has not the same tendency to slip over the edge, and the angle of instrument hooks around lower pole of tonsil and there is less chance of leaving a piece in fossa.

Small pieces of tonsil, which may be left in fossa supratonsillaris can be removed by using the instrument for the opposite side.

PERSONAL EXPERIENCES OF SOME DETAILS OF THE OLDER OTOLOGY.*

SIR JAMES DUNDAS-GRANT, London.

I venture to offer a plea for the old otology; modern otology requires none.

In order to economize the short time which I propose to occupy, I mention at once the details about which I intend to speak, namely the treatment of relaxation of the tympanic membrane, the use of the artificial drum, ossiculectomy, the closure of perforations, injections of astringents through the Eustachian tubes and certain minor methods, such as the use of the intro-tympanic bougie or catheter.

The reproach may be levelled at me that these are commonplace minutiae, but I am convinced that they are minutiae which are often neglected. I shall not dwell upon this aspect of the case.

The Closure of Perforations: My experience has led me to choose the method of closure by means of trichloracetic acid. One may succeed in closing a perforation of the extent of nearly half of the membrane. This is, however, only an occasional *tour-de-force* involving numerous applications which are fatiguing to the patient and the surgeon alike.

In illustration, I will quote the case of a young lady shop-assistant afflicted with a suppuration of several years' standing, for which an experienced aural surgeon had recommended, not unjustifiably, a mastoid operation. The perforation occupied in appearance nearly the whole anterior two-thirds of the membrane. The treatment consisted in injections of a one per cent solution of chloride of zinc up the Eustachian tube, which were followed by cessation of the discharge and subsequently numerous weekly applications of trichloracetic acid to the edges of the perforation, resulting eventually in closure of the membrane by a rather fine cicatrix, and considerable improvement in the hearing.

As a rule small perforations require only a few applications, say five or six for a perforation of a few millimeters in diameter, and, by preference, central rather than marginal, without entirely excluding the latter.

Relaxation of the Tympanic Membrane: This is a frequent cause of the persistence of deafness due to chronic catarrh of the Eustachian tube and, it seems to me, a condition too often unrecognized. I have frequently been able to effect a marked improvement, and one of considerable duration, by applications of contractile (not flexile) collodion, at intervals of two or three weeks,

*Read before Congrès Français d'Oto-Rhino-Laryngologie, Paris, May, 1921.

at the same time that the dilatation of the Eustachian tubes is brought about by means of the bougie rather than by methods involving forcible inflation.

This treatment is also of considerable value in cases of mobile cicatrices following suppuration of the middle ear.

The Artificial Drum: For this I employ the pellet of cotton-wool devised by James Yearsley, but I find that it acts better when moistened with liquid vaseline than with water, and I attach to it a fine thread in order to avoid certain possible risks. This addition has appeared to me to be of great value in view of such cases as that of a gentleman who had been recommended to me by a confrère with the warning on no account to apply an artificial drum. The gentleman, suffering from extreme deafness as the result of a past suppurative median otitis with loss of membrane had at the same time hyperostoses which narrowed the external meatus. An artificial drum which had got out of sight in the fundus of the tympanic cavity had only been recovered after long and painful efforts. The "captive" artificial drum, however, met the requirements of the case and the hearing was enormously improved.

No case of deafness following destruction of the tympanic membrane should be dismissed without the trial of this appliance, which is so simple and often so effective.

Ossiculectomy. I consider that this delicate operation has fallen into quite unmerited desuetude. I do not for a moment suggest that it can take the place of the radical mastoid operation, but I am convinced that there are many cases of obstinate suppuration which yield to ossiculectomy without which the radical operation would have been unavoidable. These are often cases of circumscribed cholesteatomata characterized by vertigo or intractable headache.

I shall not cite my most successful cases unless you desire me to do so; I prefer to narrate an instructive one of a temporary failure owing to an operative defect. The patient complained of headache and attacks of vertigo which rendered him incapable of attending to his business. He had an air of intense depression and found life scarcely endurable. The case was one of cholesteatoma in the attic of the tympanum which was, so to say, dammed up by the ossicles. Some little relief was afforded him by the instillation of alcohol and this was followed by ossiculectomy, which was only partially successful, as owing to imperfect anesthetization and preparation, the malleus alone was extracted, the incus being left behind. The patient obtained considerable relief from pain and was able to return to his occupations and interests. After some time the at-

tacks of vertigo were renewed and then under careful local anesthesia I relieved him of his incus without difficulty. From this moment his troublesome symptoms disappeared entirely.

From this it follows that ossiculectomy is an operation of considerable value, but it must be properly carried out.

As regards the hearing, it is usually better after the ossiculectomy (when performed for the purpose mentioned) than before it. In any case we must not forget the value of the artificial drum.

Catheterization of the Eustachian Tube. Although this seems a trivial point, it may occasionally fail even in the most experienced hands. I have seen it and I have experienced it. *A fortiori* it happens fairly often in the hands of the less expert. It is never safe to accept the statement of a new patient that he has undergone treatment with the Eustachian catheter and that it has not not done him "a bit of good." We must assure ourselves by personal trial that the catheterization has actually been effected. This fresh trial may make it evident that the tympanum has never been really inflated, an experience I have often had before me in civil practice and more recently still oftener in military work. We must not, however, be too ready to criticise our predecessor, remembering that he may have had to carry out his endeavors under very unfavorable circumstances and to content himself with an imperfect catheterization without being to blame, or to have had to deal with a patient who withdrew prematurely from a course of treatment which would have done him good. Be this as it may, the obstinancy of a case of deafness is often explained by the fact that the inflation has in reality failed.

As a practical point, we should in cases of doubt—and there are some—make sure that the inflation has succeeded and, in order to make our assurance doubly sure, pass the fine intra-tympanic catheter through the Eustachian one. (Macleod Yearsley has recommended this use of the instrument.)

In placing before you these minutiae I feel I may be exposing myself to ridicule, like Monsieur Jérome Paturot in Reybaud's novel, who, in his position as representative of a constituency in the Chambre des Députés, was called upon to plead the cause of his electors and began thus: "Messieurs, je viens parler a mon pays d'une industrie qui l'interesse vivement, celle des fromages. . ."

Let us save our patients' lives by means of the modern surgical otology of which we have the right to be supremely proud, but do not let us throw aside the details of the old otology, which may make it possible for us to render their lives agreeable or at least tolerable.

MY OBSERVATIONS AFTER SIX YEARS OF CONSTANT USE OF THE SLUDER METHOD FOR TONSILLECTOMY.*

Dr. E. J. Stein, Lancaster, Pa.

I first want to apologize for adding to the already voluminous literature on the tonsillectomy question and yet I feel that anything that is apt to improve the technic or the ease with which it is done is quite worth while.

I began using this method following a visit to the clinic of Dr. Joseph C. Beck in Chicago during the late summer of 1916. While the technic of the operation as done by him is radically different from that practiced by Dr. Greenfield Sluder, yet the basic principles of the procedure are not essentially different, except one point which I will point out later.

In the beginning of my work, I will confess that I was very much disheartened with the apparent failures that I encountered, and the tonsils that I could not evert, so that I was dissecting them out in a great majority of the cases but I persisted and watched carefully the successful ones and finally, after about six months of practice, I was able to evert about 60 per cent of the cases, which has steadily increased until today I am able to use the method in about 90 per cent of the cases attempted. I cannot say that I can use the method in 99.7 per cent as Dr. Sluder says that he does. The cases that I have not as yet mastered are the ones where you have a thin flat tonsil with no body to it so that the feel of eversion is not present. However the beauty of the operation lies in the fact that if you are unable to engage the tonsil properly you can go ahead and do a dissection even more readily than before the attempt at eversion.

The ideal tonsil operation is the one that will remove all the tonsil tissue and leave the muscle structures absolutely intact with little or no hemorrhage following. I also believe that the time under ether is a very important factor and should be as short as possible. These requisites are fully met by the operation and I feel it is the safest method that we have today.

Concerning the first requisite, I feel that there is no dissection that will be as clean and smooth and with less damage to the pillars

*Read before the Philadelphia Laryngological Society, Feb. 7, 1922.

as the Sluder method and further it is a practical impossibility to include any muscle tissue in the instrument with any manipulation that may be attempted. If the operator learns the feel back of the tonsil when the eversion is complete, there is no chance to leave any tissue and especially the superior pole, which is the part most apt to be left by the dissection method. If the instrument has not included the whole structure there remains a hard, firm, even tense, mass back of the instrument which can easily be felt and informs the operator that not all the tonsil has been engaged. When this occurs the instrument must be released and another attempt made to include the whole structure. It is not necessary to remove what you can get and then go after the rest and in fact it is not possible to pick up these tags of tissue should they be left behind but it will then be necessary to remove them by dissection.

As for the damage done to the muscle structure, I would say that in all the cases that I have done, or were done by my assistant or residents, there was not one case of mutilation and the pillars were both intact their entire length. This is remarkable when you stop to consider that the residents, especially, were as inexperienced as they could be, never having done a tonsillectomy before their service in our hospital. Perhaps this fact is due to a part of the technic which as far as I know Dr. Beck still uses; namely, to first of all introduce soft rubber catheters into the nose and bring them out through the mouth when they act as palate retractors and put just a slight tension on the muscles. These are held by the anesthetist, leaving the assistant with both hands free for using the suction and the pressure sponges. These catheters were used by Dr. Beck to control bleeding after removal of the tonsil and no tension is put on them until after the tonsil is removed but I have varied this slightly by having the anesthetist make just a slight tension on them while the tonsil is being engaged and I find it is a bit easier to manipulate the eversion with this slight pull. Of course it means that the anesthetist must be trained to do this in addition to his usual work.

The instrument that I have used is known as the Beck-Schenk snare and here is where the technic differs radically from that of Sluder's in that the cutting agent is a wire while that of Sluder is a blade. I personally have a preference for the wire because I believe that it is more positive in it's eversion as the pull is in all directions toward the center while in the instrument of Sluder, or those on the same lines, as the LaForce and others, you have the pull exerted in parallel lines, as it were, from before backwards.

I must confess that there is a certain something to be acquired before one becomes at home with the operation which is hard to put into words but if a painstaking effort is made to study the principles involved it becomes a simple manipulation, a positive and certain thing in which you learn to place entire reliance knowing that when you have finished you have really removed every vestige of tonsil tissue and have done absolutely no damage to the normal and necessary muscle structure.

As for the hemorrhage following this procedure, I do not claim any bloodless surgery, although I have done some cases where it has only required two sponges for the entire operation and where not more than a half dram of blood was lost, yet I would consider this the exception rather than the rule. However, I will frankly state that I will loose twice as much blood with the dissection method as I will with the Sluder method. I have tried the so called bloodless or hemostatic instruments with the clamp blade and have had some very severe bleedings with them.

Concerning the post-operative hemorrhages, I almost hesitate to give my experiences, being of a superstitious nature, yet in a thousand and slightly more cases that I have done during this time, I have had but three post-operative hemorrhages, and of these only two of them required intervention and strangely enough they were brother and sister and the bleeding occurred about six hours after operation. A note of explanation however is necessary here as I feel that a routine procedure that I follow largely overcomes this danger. After a tonsil is removed I pack the fossa with a gauze tampon which is left in place while the operation proceeds. When everything is completed these sponges are removed and if there is any bleeding whatever they are repacked and a few minutes later removed and if there is still the same amount of bleeding, I replace the pack in the fossa and sew it in place with catgut sutures through both pillars and including the pack so that there is no possibility of sliping out. This sewing of packs is routine with all adults and such children as show any tendency toward free bleeding on the table. All cases when leaving the table must be absolutely dry and I feel that if this precaution is observed that the number of post-operative hemorrhages will be very small indeed. This is not original, but was suggested to me by Dr. Beck, with the remark that "he could then go home and feel that there was no chance of bleeding." The packs are quite uncomfortable while they are in place but I feel that the discomfort is small compared to the

pain of packing afterward, to say nothing of the anxiety as the laity are quite familiar with the danger of hemorrhage especially in adults.

I have previously stated that in the dissection method the danger lies in leaving a part of the superior pole in place and while this portion of the tonsil is invariably completely removed by the Sluder method, if properly done, yet there is a more likely possibility of leaving a portion of the lower pole unless great care is exercised in seeing that the instrument dislodges the tonsil upward before any attempt at eversion is made. It is my rule to insert the instrument first at an angle so that the window engages the lower portion well below the base of the tongue and then I make pressure directly upward until there is a decided prominence made by the body of the tonsil in the soft palate when I make counterpressure with the finger and press the tonsil through the window and at the same time rotating the instrument through an arc of 45 degrees and catching the tonsil with the wire, the rest is simply a matter of snaring off the tissue. The entire operation is so quickly done that a great deal more time can be devoted to the checking of the bleeding so that you will have your patient absolutely dry and yet consume no more time than would be consumed by a regular dissecting operation and certainly with much less bleeding. This certainly is a much desired thing.

Let me take up the matter of failures. I am of the opinion that these are due entirely to lack of sufficient manual dexterity and the failures of earlier attempts were due to lack of appreciation of the mechanical principles and when one has once overcome them then I would say that every tonsil lends itself to removal by this method and one merely has to know how and you will succeed. I well recall the case of an adult of 29 years, who had had about thirty attacks of quinsy according to his family physician, and had been lanced a great many times, surely a case to expect a lot of scar tissue, and yet outside of the fact that I had to make more counter-pressure than in the average case, I was able to evert his tonsils and remove them with no great deal of trouble. One must learn the exact amount of pressure that you can make without tearing the pillars as well as to learn the direction in which it has to be made. It is a two handed operation and the necessary experience required before one becomes an adept is the serious drawback to its general acceptance.

I also want to call attention to the matter of what I choose to designate as recurrences of the tonsils. I have had several cases

so closely resembling each other that I feel that they will bear discussion. After a thorough removal of the tonsil and about two to three weeks later I noticed a smooth swelling in the lower angle of the tonsillar fossae. In one case in particular this continued to enlarge until there was more tissue in the fossae than there had been before the operation. The particular case I have in mind went on to pulmonary and laryngeal tuberculosis although having been apparently well before the operation. I was able to follow this case for several years and I felt that there was an underlying tubercular infection which may have been aroused by the administration of ether. I have been able to show an underlying tubercular condition in a youth of 13 years where there was a recurrence of tissue after a second thorough removal and I am at present watching a young man who had a tonsillectomy a number of years ago, done by me, with recurrence and to remove a possibility of poor or faulty technic, had him operated upon by a very able operator and to my disapointment I noticed a similar beginning recurrence about two weeks after his second operation which at first appeared complete and clean. These are the only class of cases that I have noticed where the operation has not been satisfactory and I do not think that it can be blamed upon the technic so much as to the so-called dyscrasia.

I am firmly of the opinion that there is no operation that is as thorough and complete, does the least damage, causes the least bleeding and gives the prettiest end results as does the Sluder operation. I admit that the finished technic is not easily acquired but when once perfected I am firmly convinced that the great bulk of operations done by the same operator will be far more satisfactory to the patient as well as to the operator when using the Sluder technic than when done by any other method. I know of no untoward results and I have been very critically examining some of the cases that I did four or five years ago and I can sincerely say that I am satisfied with them. It is true that I have had some very satisfying results before using this method but I am also sure that my results during this period have been more universally pleasing. They certainly have been more easily done.

225 N. Duke Street.

REPORT OF A CASE OF BILATERAL FRONTAL SINUS EMPYEMA, SUBDURAL AND SUBPERIOSTEAL ABSCESS WITH RECOVERY.

Dr. Manford B. Waltz, Fort Smith, Ark.

Carl Dunn, a minor, aged 19 years, came under observation July 29, 1921, complaining of headache, pain and swelling over frontal region, fever, and nasal obstruction and discharge.

Two weeks previously patient got a "cold in his head" which was accompanied by considerable nasal discharge. On July 17 the symptoms complained of began. Headache, located in frontal region, throbbing in character, especially on movement, has increased in intensity to present date. Pain and tenderness on pressure over frontal region is constant and severe. Swelling began in left upper eyelid, then involved frontal area and right upper eyelid; subsiding in right upper eyelid after two days, but persisting in frontal region and left upper eyelid. Temperature varied from 99 to 103. Nasal discharge has been profuse and has character of pus. Nasal obstruction has been constant, especially on left side, most of life. General and previous history negative, except for frequently repeated "colds in head."

11:00 A. M. Examination reveals a well-developed and nourished man of about 20 years, who appears to be in considerable pain, though very sluggish and toxic. Pulse 68, irregular. Temperature 99.6.

Head. There was a swelling of the frontal region extending about an inch and half on each side of the midline, to the hair line, and down into the upper left eyelid, closing the left eye. It was tender to touch and fluctuated on palpitation. On aspiration in frontal region pus was obtained. Eyes—R. V. 20/15 L. V.? Pupils pin point in size, due to morphine. Conjunctiva and media of right eye appeared normal, but there was a swelling of the nerve head about two diopters. Nose—Marked deviation of septum to the left. Mucosa was inflamed and a large amount of yellow pus found in all meati of left side; small amount in right side. All sinuses transilluminated poorly.

X-ray of sinuses. Lateral view showed large, deep frontal sinuses. Antero posterior view under exposed and sinuses failed to show up. Another view taken just before operation, but not read till after, showed clouding of all sinuses.

General examination. Heart irregular, no murmurs. Otherwise negative. Spinal puncture, spinal fluid clear, under great pressure.

Laboratory reports: Pus—Smear showed staphlococci. Spinal fluid—Cell count 10; globulin tests negative; W. B. C. 14,000. Urine negative. A preoperative diagnosis was made of subperiosteal frontal abscess empyema of frontal and ethmoidal sinuses and subdural abscess and immediate operation was advised.

Operation. Performed at 2:30 P. M., July 29, 1921, at Sparks Memorial Hospital. Usual preparation for Killian operation. Ether anesthesia. As most of our symptoms pointed to a left-sided infection, a left Killian incision was made and a large subperiosteal abscess over the frontal region was drained at this time. No communicating sinus was found. On opening into the left frontal sinus through a very thick outer table, the sinus was found to be full of pus. After completely uncovering the left sinus pus was found coming from the right side. Our incision was then continued across and the right sinus completely uncovered. An opening due to necrosis was found through the left orbital roof. The orbital roofs were removed, the superciliary ridge being left on both sides. The ethmoids were then opened up and curetted, making a large opening into the nose on both sides. Search was then made for a sinus through the inner table, which was found low down near the floor of the sinus and the midline on the left side. It was very small, but pus was oozing through. Starting at this point, the inner table was removed, uncovering a large subdural abscess. The inner table was removed over the whole abscess, a space of at least two square inches being uncovered. As the patient was not doing well at this time we thought best to cut short the toilet of our operative field and putting in a loose gauze pack through the nose and external wound, we left the external wound nearly wide open. Time of operation, 1 hour and 15 minutes.

Post operative recovery was uneventful except for two convulsions on the eighth day. These probably were due to the packing in wound producing too much pressure, for after this was changed no more convulsions took place.

In October, under local anesthesia, the frontal scar was resected and a fairly large depression obliterated. The patient has been working in the mines since then. We might also add that there is a good cosmetic result. A very small external sinus still remains, which is closed part of the time and will be taken care of soon.

Comment: I present this case as a matter of record and not because there was an unusual features to it or because of any unusual skill or treatment by me that brought about the desired result, recovery of the patient.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

Regular Meeting October 13, 1922.

Radical Mastoidectomy; Complete Healing; Method of Controlling Persistent Vertigo. Dr. Jacob L. Maybaum.

Hugh B., age 26 years, was admitted to Manhattan Eye, Ear and Throat Hospital, service of Dr. Berens, June 10, 1919, with a history of distressing vertigo and falling of six months' duration.

The patient had the usual diseases of childhood. Double middle ear suppuration dated back thirteen years following diphtheria. From then until the onset of vertigo six months ago, except for aural discharge and impaired hearing, there was no complaint of the ears. The dizzy attacks at the outset, occurred at infrequent intervals, until six months before entering the hospital. The attacks then became of greater severity, occurring daily and being accompanied by falling, particularly to the right.

Aural examination disclosed a moderate, foul smelling discharge from each middle ear with perforation and granulations in posterior superior quadrant. Hearing in the right ear markedly diminished, whisper not heard, C (128) and C_4 tuning forks not heard. $C_1 - A = 4$ sec. B. 15 sec. Weber to the right. Mixed form of deafness—advanced middle ear deafness with degenerative cochlear changes.

Hearing in the left ear fairly good—whisper 8 feet; Rinne negative; high tones as well as the low and middle tones slightly reduced.

There was a spontaneous nystagmus to the right, occasionally to the left, no spontaneous past-pointing. Fistula test negative.

Turning to right—horizontal nystagmus to the left 20 sec. Turning to left—nystagmus to right 22 sec.

Caloric stimulation of the right and left horizontal and vertical canals gave normal responses for nystagmus, past-pointing and vertigo.

I did a radical mastoid operation on the right side. Sclerosed mastoid. Cholesteatomatous mass in antrum and aditus and granulations in middle ear removed. The patient left the hospital on the tenth day decidedly better, but still complained of occasional milder attacks of vertigo.

The spontaneous nystagmus disappeared at the end of two weeks, the hearing in the right ear remained as before the operation. The patient came to the clinic for two or three dressings; did not appear again for six weeks. He then returned with the story of having been unable to attend the clinic because of severe attack of acute articular rheumatism. During this period the ear had been dressed in a more or less perfunctory manner by his family physician. The vertiginous symptoms had returned with almost as marked an intensity as previous to the operation.

Examination of the operated ear now disclosed an almost complete atresia of the meatus, the canal was filled with partly organized granulation and connective tissue. There was a fistula in the postero-inferior region of the canal through which a thin, purulent, foul-smelling discharge was escaping.

Hearing very much impaired; could hear only loudly spoken voice with noise apparatus in left ear. Tuning forks not heard. Galton whistle heard.

Caloric test (right ear) ineffective because of the partial atresia of the canal. Caloric (left ear) normal response. A combined spontaneous nystagmus to the right present. Turning to the right ten times in twenty seconds resulted in horizontal nystagmus to left of 18 seconds' duration. Turning to the left nystagmus to the right 20 seconds' duration.

Patient was readmitted to the hospital. I reopened the post-auricular wound. Curetted granulation in meato-mastoid cavity and did a plastic operation.

Patient left the hospital in a few days; meato-mastoid cavity completely epidermatized in eight weeks. Until the end of May, 1922, the patient continued to complain of vertigo; at times this became so distressing that he had to discontinue his usual activities. Enforced rest gave only temporary relief. The symptoms described by the patient were definitely those of a systematized vertigo. Occasionally these attacks were accompanied by nausea, but never vomiting. The spontaneous nystagmus ceased two weeks after the second operation and was not again observed.

Functional examination October 11, 1922.

Right	Left
O	15 feet
	Whisper Lateralizes
C_1-A: 8 sec. B: 25 sec. Other forks not heard. Voice heard with noise apparatus in left ear.	C-A 115 B: 25 C_4—6 sec.
Caloric positive in 35 sec.	Caloric not performed (dry perforation)

Turning to R horizontal nystagmus to L. 22 sec.

Turning to L. horizontal nystagmus to R. 18 sec.

Every possible factor causing these attacks of vertigo were considered in order to give relief to the patient.

1. A continuance of irritation from a para or perilabyrinthine condition in the operated ear was constantly kept in mind.

2. A paralabyrinthine inflammation in the non-operated (left ear) was for a time seriously considered. Because of the marked diminution of hearing in the operated (right ear), I was loathe to seriously regard this factor from the standpoint of operative interference. The presence of comparatively good hearing in this ear (whisper 8 feet), together with absence of spontaneous nystagmus pointed against the left ear as a causative factor. Fistula test negative. Under treatment this ear has further improved (hearing now whisper 15 ft.); there has been little, at times no discharge during the past year.

3. Both vestibular nerves and their intracranial pathways gave normal responses for nystagmus, past-pointing and vertigo.

4. Cerebro-spinal lues has been ruled out. Wassermann being negative.

5. Other extraneous factors, as local infection, gastro-intestinal disease, errors of refraction were carefully considered and eliminated as causes.

6. Vaso-motor disturbance of the labyrinth. After unsuccessfully running through the gamut of the various remedies advised for the relief of these patients, such as small doses of quinin, large doses of bromides, pilocarpin, etc., in an empirical way, I began to use of solution adrenalin 1/1000—ten dorps b. i. d. by mouth as suggested by Vernet in his article "The treatment of vertigo by means of Adrenalin," appearing in the March, 1922, issue of THE LARYNGOSCOPE. In a few days the patient obtained complete relief from his annoying symptoms. Withdrawal of the adrenalin for a few days after its administration for ten days was followed by a return of vertigo, but to a lesser degree. Adrenalin administration was interrupted every ten days. During the past two weeks adrenalin medication has been discontinued with no recurrence of vertigo. His general condition has steadily improved during the past few months.

Chronic Middle Ear Suppuration Complicated by an Acute Suppurative Labprinthitis; Meningitis Sympathica; Labyyrinthectomy; Recovery.

Dr. I. Friesner and Dr. J. L. Maybaum, New York, N. Y.

A careful decision as to the time of operation is of utmost importance in determining the outcome of a case of suppurative labyrinthitis.

On the one hand there are those favorably disposed to prompt surgical interference during the acute stage of the disease or with the onset of symptoms of meningeal involvement. The majority of otologists in this country regard the layent stage the ideal time for labyrinthine surgery.

A labyrinthectomy too early performed, before barriers against spread of infection have been erected, usually results in a diffuse purulent men-

ingitis. Meningeal involvement occurring during the course of an acute suppurative labyrinthitis is not necessarily an indication for immediate surgical interference. The clinical course and repeated spinal fluid examinations are especially helpful in arriving at a decision. A persistent high count in the spinal fluid, together with clinical evidence, for operation.

The problem of so important a decision confronted us in this case.

Anna H., age 26 years, was admitted to the ear service of Dr. Friesner of Mt. Sinai Hospital January 29, 1922, complaining of intense generalized headache, rigidity of the neck of four days' duration.

Three years ago the patient had a severe attack of influenza, during the course of which she developed an acute purulent otitis media on the left side. From then until last Christmas, except for moderate purulent discharge and slightly impaired hearing, the patient had had no symptoms referable to the ear. At this time, without any assignable cause, she began to vomit, complained of severe vertigo and staggered on attempting to walk. The tendency to stagger and fall was not in any definite direction. There was no history of pain, fever or chills. The attack continued for three days, the symtoms lessening in severity and entirely disappearing at the end of this period. Two weeks later, about January 7, the patient had a recurrence of her former symptoms and in addition intense pain in her left ear, which subsided the following day. This attack, as in the previous instance, lasted three days. During the next three weeks the patient was quite free from symptoms. On admission to the hospital she complained of intense lancinating pain in the head and rigidity of the neck of four days' duration. She had no pain in the ears, no nausea, vomiting, staggering or dizziness as on the previous occasions. Temperature on admission 105°, pulse 100, respiration 28.

Examination of the left ear disclosed a chronic middle ear suppuration. There was a large granuloma springing from a perforation in Shrapnell's membrane; a moderate foul smelling purulent discharge from the middle ear, no evidence of an acute exacerbation. No tenderness or thickening over the mastoid. The right ear is normal.

Functional examinations disclosed a complete loss of labyrinthine function on the left side. There was a total deafness and complete loss of vestibular reaction on caloric stimulation. Fistula test negative.

The patient had marked rigidity of the neck. There was no Kernig or Babinski. Mentality clear. Ocular fundi normal. Four days later evidence of a left-sided facial paresis began to assert itself.

The temperature from 105° on admission gradually came down to 100° in five days and remained between 99° and 100° during the next three days. The patient vomited at times. Headache and rigidity of neck lessened decidedly. Two days later there occurred a distinct rise of temperature from 99° to 105°; this was repeated on two succeeding days. The temperature then remained between 100° and 101°. Pulse throughout about 100.

Four lumbar punctures were made with these interesting findings:

January 29. Spinal fluid slightly cloudy, under moderately increased pressure. 4400 cells to the cm. 90 per cent polys. Smear showed gram positive extra—cellular diplococci—two to the field. Could not be grown in culture.

January 30. 6400 cells count, 90 per cent polys., no organisms on smear or culture.

January 31. Turbid fluid under moderately increased pressure. 1060 cells per cm. m., 90 per cent polys.

February 7. 1200 cells with an excess of lymphocytes. Fluid not quite so turbid as previous specimens. Blood culture negative.

1. 29. 22: W. B. C. 12800; polys 94 per cent, lymphocytes 6 per cent.
2. 9. 22: W. B. C. 14000; polys 87 per cent, lymphocytes 13 per cent.

With the above history, aural examination, laboratory findings, a diagnosis of acute suppurative labyrinthitis with meningeal involvement was made. We hesitated to call this a bacterial meningitis based on one laboratory finding—and this only a smear. The treatment, however, was

clearly indicated—nothing less than a radical mastoidectomy and a labyrinthectomy. The question, however, as to the time of operation was one of utmost importance. We decided to temporize for the time being in order to permit the inflammatory process in and about the labyrinth to become localized. The first spinal fluid examination, indicating the presence of a bacterial meningitis, pointed to a hopeless condition.

At the expiration of two weeks from the time the patient was admitted, we decided to operate. Patient was then having temperature. I did a radical mastoidectomy. Mastoid schlerotic throughout. Cholesteatoma in the antrum and aditus. A fistula could be seen in the horizontal canal. Dr. Friesner then did a labyrinthectomy. This consisted of thoroughly exposing and uncapping the three semi-circular canals, opening the vestibule and uncapping the cochlea. While uncovering the horizontal canal, the necrosed lower lip became loose, resulting in an exposure of the facial nerve above the oval window for a distance of about one-half inch. The paresis, no doubt, had been due to pressure or irritation from the necrotic area of bone.

The patient reacted very well following the operation. Headache ceased entirely after forty-eight hours and did not recur. To our great surprise and gratification the exposure of the nerve did not result in a facial paralysis; on the contrary, the paresis which had been previously present rapidly improved and is now no longer evident.

After the first full dressing, Dakin's solution was used throughout. A plastic operation was not done. Patient left the hospital March 24, 1922, relieved of the serious condition for which she had come.

The salient features of this case are:

1. Chronic middle ear suppuration: two distinct attacks of labyrinthine disturbance; acute purulent labyrinthitis; meningitis sympathica.
2. Development of a facial paresis before operation; rapidly disappeared in spite of exposure of the nerve at the lower lip of the horizontal canal.
3. Laboratory findings in the spinal fluid characteristic of a meningitis sympathica.
4. Decision as to the time of operation.
5. Prompt disappearance of all symptoms following a labyrinthectomy.

Chronic Suppurative Otitis Media; Radical Mastoidectomy; Acute Suppurative Labyrinthitis; Serous Meningitis; Labyrinthectomy; Recovery. Dr. Mark J. Gottlieb.

Mrs. E. J. October 10, 1921. Aged 26 years. Married.

Has had a discharge from the right ear since childhood. The discharge has been intermittent, there being long periods when it was not evident. For the past eight months, the ear has been discharging constantly, but not profusely. The patient has had headaches most every day, and dizziness occasionally.

There is a large perforation of the inferio-posterior portion of the right drum, and the discharge, although scant, is fetid. Spreads of the discharge reveal Gram-positive cocci, epithelial cells, and no cholesterine crystals. All the attachments of the muscles at the base of the skull, including the sterno-cleido-mastoid, were exquisitely tender. The tonsils were large and the crypts contained many cheesy concretions. An examination of the hearing revealed that the Weber was referred to the right, the low tone limit of the right ear was raised above forty-eight double vibrations. The Rinne was negative. Conversational voice, nine feet, as compared to the left, which was forty feet. Whispered voice was heard three feet with the right ear as compared with the left, fifteen feet. The high tones were heard equally with both ears.

In consideration of the fact that the right ear was a serviceable organ by virtue of the result of the hearing test, and the tonsils were diseased, probably being the cause of all the symptoms, the tonsils were removed under ether anesthesia and in a comparatively short time the headache and occasional dizziness disappeared.

About four months later, the patient complained of headache, slight vertigo, nausea, and when the discharge from the right ear ceased, the

patient felt drowsy. When the ear began to run again, the drowsiness disappeared.

Examination of the vestibular apparatus demonstrated that she past-pointed spontaneously to a slight degree with the left arm to the right, and on attempt to overthrow backward, the pelvic girdle reaction was not prompt. There were no other spontaneous phenomena. On turning to the right with the horizontal semi-circular canals parallel to the floor, she developed a large nystagmus of twenty-five seconds' duration, to the left. The same result was obtained on rotation to the left, except that the nystagmus was to the right. On rotation to the right, with the vertical canals on the horizontal plane, she fell markedly to the right. On rotation to the left in the same position, she fell slightly to the left. On rotation to the right, she past-pointed twelve inches to the right with the right hand, and with the left past-pointed slightly to the left, and then four inches to the right. On rotation to the left, the past-pointing was found to be normal. Caloric reaction was not performed.

The X-ray made by Dr. Frederick M. Law was as follows:

The right mastoid is undeveloped and shows some sclerosis around the knee. There is a small area below the knee, between the anterior wall of the sinus and the posterior canal wall, which shows bone absorption.

The region around the antrum shows organized tissue, with some bone absorption below the tegmen which suggests cholesteatoma.

This is evidently a chronic ear with some bone absorption.

The left mastoid is small and clear.

In view of these findings, it was felt that when the discharge from her right ear stopped it accumulated and caused a pressure symptoms, and a radical mastoid operation was performed. The bone was very hard and very few cells were encountered. The mastoid antrum and the area between the posterior wall and the lateral sinus contained cholesteatomatous material. The sinus plate was necrotic at the knee, and the dura of the middle fossa was exposed for an area about the size of a dime. The dura was opaque and covered with slimy material and was definitely separated from the surrounding bone.

About eighteen hours after the operation, the patient developed nausea, vomiting and vertigo, accompanied by a rotary nystagmus to the opposite side. During the severity of the attack, which lasted for about eight days, the patient lay constantly on her left side with the eyes turned to the right. About the fifth or sixth day her hearing was tested and she was found to be stone deaf in her right ear. From that time on the patient made a rapid recovery and left the hospital at the end of sixteen days. Although still dizzy she was able to walk without assistance and each day showed a progressive improvement. It was felt, however, that we were dealing with an acute suppurative labyrinthitis which at any time might manifest itself by meningitis or brain abscess.

About six and one-half weeks after the radical mastoid operation, the patient began to complain of pain in the right side of the head, which became very severe at the end of three days. During the day she had a dull headache, but at night this became so intense that the patient was prompted to pull the hair out of her head in desperation. Definite tenderness of the skull on the right side above the back of the ear was elicited. A small drop of creamy pus was always present in the ear about the tympanic wall. There was no nystagmus and she past pointed spontaneously three inches to the right with the right arm and touched with the left. There was a definite tendency to fall backward with the eyes closed while standing upright.

A neurological examination was made by Dr. Marcus Neustaedter and he reported as follows:

Blood pressure.—Maximum systolic, 118 mm. Hg.; minimum dyastolic 90, pulse 108, temperature by mouth 99.5. Pupils, small; react promptly to light and accommodation. Right fundus, negative; left shows an old hemorrhage in the retina. Patellar reflexes, right, 1 plus; left, 2 plus. Pharyngeal reflex, absent. There is some swaying on standing with the eyes closed, but no true Rhomberg. A slight right facial paralysis, especially in the lower quadrant, is manifest, also a motor weakness in

the right masseter and ptorigoid muscles. The uvula assumes a diagonal position to the left. A left hemiparesis is apparent.

Diagnosis: Basilar meningitis and possibly a temporo-sphenoidal lobe abscess.

The cerebro-spinal fluid revealed a slight turbidity, globulin 1 plus, Fehling 1 plus, Wassermann negative, cultivation negative, 500 cells to the cubic mm. On the day following, the cells increased to 1040, and the fluid remained sterile.

On the same day she past pointed spontaneously with the left hand slightly to the right. The right ear remained stone deaf, good hearing was evinced in the left ear. No response was obtained from douching the right ear with cold water. On douching the left ear, no nystagmus or past pointing was elicited with the head upright, but with the head tilted backward, a large horizontal nystagmus to the right developed, but no past pointing was elicited in this position.

Dr. John McCoy was called in consultation, and it was agreed between us that as long as the number of cells in the cerebro-spinal fluid had increased to such an extent in twenty-four hours, and the symptoms showed no signs of abatement, a labyrinthectomy was indicated immediately and was performed that day by Dr. John McCoy with Dr. Mark J. Gottlieb assisting.

The Hinsburg operation was done. A very small dark area was found just above the prominence of the external semi-circular canal which looked like an area of necrosis. When a ring currette was passed over the internal tympanic wall from below upward, the face was seen to twitch several times, which indicated that the facial nerve was exposed either anomalously or as a result of bone destruction. The uncapping of the external semi-circular canal was begun at the place where the fistula was found and in using the curette in a downward direction, a fairly large sized piece of bone was slivered off the internal end of the posterior bony wall of the external auditory canal and it was feared that either the facial nerve was exposed or completely severed. Fearing that possibly this patient might later show signs of abscess of the cerebellum, a decompression of the posterior fossa was done at the same time. The day following the operation, a complete facial paralysis of the right side was found, with the exception that the patient could partially close the right eye. On the same day, the number of cells in the cerebro-spinal fluid decreased to 450, and from that time on, she made an uneventful recovery.

The facial paralysis has been treated ever since the patient has left the hospital, with massage and very light galvanic electric current and for the past three weeks a very definite activity of the muscles of that side has been apparent.

October 10, 1922. The muscles of the right side of the face are gradually regaining their power, and a complete restoration of their function is expected.

DISCUSSION.

DR. KREMSKI (Brooklyn) inquired whether there was any relation between the blood pressure and the symptoms in Dr. Maybaum's case.

DR. HERZIG desired to know how the findings of the mastoid cavities compared to the X-ray interpretations. As he believes that not only should the Radiologist have a complete history of the case before the picture is taken, but the operators should notify the Radiologist what what his diagnosis was (post-operative) also his operative findings. In this way only will the Radiographer perfect his opinion in reading future plates.

DR. KING congratulated both Dr. Maybaum and Dr. Gottlieb on the excellent results secured in their cases. It was unusual to be able to show such patients in such excellent condition.

DR. MAYBAUM said that Dr. Gottlieb's case presented features of great interest. These cases of traumatic labyrinthitis require extreme care in the handling of them. Under ordinary circumstances it is a safe policy to leave well enough alone until definite reasons for interfering present

themselves. He then cited a case of labyrinthitis following an acute middle ear suppuration. The patient, a boy of thirteen years, was referred to him because of unilateral deafness and discharging ear of three weeks' duration. A paracentesis had been done by the family physician, followed immediately by severe labyrinthine symptoms. The symptoms continued for five or six days. On examination he was found to have total loss of hearing and vestibular function. There was also evidence of a mastoiditis present. When the father was told that the boy would have to be observed a few days and labyrinthectomy might be necessary, he took the child elsewhere. I was then informed that a simple mastoid operation was done, followed by development of a facial paralysis ten days later and a fatal meningitis shortly after. Labyrinthectomy ought surely to have been done with the onset of a facial paralysis in this case.

In these traumatic cases following an acute or chronic middle ear suppuration it seems to be a better policy to wait for some clinical evidence of trouble before opening the labyrinth, and especially to be guided by the cerebro-spinal fluid examinations. Some of these cases get well without operative interference. A labyrinthectomy should not be done during the acute stage of the disease.

DR. WM. SIEGSMEISTER asked what were the indications for the labyrinthine operation, and cited a case recently observed. If a case showed all these symptoms,—dead labyrinth, high temperature, meningeal symptoms, cloudy fluid, etc., what was the rationale of waiting?

DR. GOTTLIEB, referring to what Dr. Maybaum had said about traumatic cases and the necessity of waiting until meningeal symptoms arise, cited a case occurring in his private practice some years ago in which a simple myringotomy was done. After 48 hours the patient developed acute suppurative labyrinthitis; and six months later he developed a meningitis and died in 24 hours. It had always been a question in his own mind whether it would not have been better had he opened up the labyrinth when the man had the initial labyrinthitis, rather than wait until the serious symptoms developed and there was no chance of saving life.

Dr. Gottlieb said that probably the explanation for the reduction of irritability in the other labyrinth was due possibly to the meningitis with a fibrinous exudate which organized and compressed some of the nerves, or involved the sheath of the opposite nerve, or possibly an involvement of some of the nerve tracts in the base.

DR. MAYBAUM said that the reason for delaying operation in his case had been stated. Each case was law unto itself as regards indications for operation. There are many cases where the same course followed as in this case would have resulted in a fatal outcome.

In this case the patient was seen when she had an acute suppurative labyrinthitis with beginning meningeal symptoms, high cell count and bacteria in spinal fluid. The spinal fluid was sterile at subsequent examinations. The case appeared hopeless at the beginning. To have operated then in all probability would have caused a spread of the infection from the labyrinth to the meninges. Repeated spinal fluid examinations were made daily and showed a steady diminution of the number of cells. The polys later were replaced by lymphocytes, pointing to a recovery tendency. Each case must be considered individually. In spite of rather stormy course during the first few days, she showed a steady tendency to betterment. After an interval, she showed evidence of a recurrence of symptoms. It was then decided to operate. The tendency, in handling these cases, is toward conservatism. As a rule a delay of ten days or two weeks is best so as to allow barriers to be formed against spread of infection.

Acute Mastoiditis with Iodoform Poisoning, Right Ear; Acute Mastoiditis in Unusual Mastoid, Left Ear. Dr. Harold M. Hays.

There was nothing of unusual significance in the history of the case, but the patient was presented to give an opportunity to inspect the two mastoid wounds and to see the amount of destruction that can occur as the result of iodoform poisoning.

Seven years ago the patient had a typical mastoid infection, which was operated upon by an eminent otologist, who packed the wound with iodoform gauze. A few days later the patient's temperature rose to 105°, and nothing could be found to account for it. That state of affairs continued for ten days, the wound being packed with iodoform gauze, and no one suspected the cause of the trouble. After a week the gauze was removed, and eventually recovery took place, with a large wound extending far back in the head. After six years there is still a place which constantly scales and has to be cleared off. Last May the patient developed an acute infection in the other ear, and great care was exercised as to what was done. Dr. Hays waited for about ten days, before suggesting operation, testing the hearing as best could be done with the destruction and suppuration that was going on; and at the end of that time it was explained to the patient that it would be better to operate on his ear rather than to run the risk of becoming totally deaf. The operation was performed early in June, and an unusually large mastoid cavity was exposed. An incision, extending backward two inches in length, was necessary. Learning from the patient that he was susceptible to most drugs, it was felt that neither Dakin's solution nor iodoform gauze could be used, so the wound was dressed with plain gauze packing, sufficient to keep the edges open. At the end of the fourth or fifth day it was decided to try balsam of Peru, and that was the dressing used later on when the edges of the wound were drawn together by adhesive strips. The caustic stick was used on the granulations.

DISCUSSION.

DR. DAVIS said that as all knew he was an earnest advocate of the blood clot dressing following mastoidectomy, and this was a case in which it would have been very applicable. Particularly is this so in regard to the side first operated, for the iodoform packing, notwithstanding it had produced some iodoform toxcity, it certainly had rendered the wound cavity chemically sterile, therefore, by simply discontinuing the iodoform packing, thoroughly curetting the wound surfaces, admitting the blood-clot and closing the wound completely, in my opinion, healing would have been prompt, painless and without this great deformity. Again, no matter how large the mastoid cavity, the blood-clot fills the dead space which obviates the necessity of packing the wound.

In the second operation in this case, on the opposite side, the blood-clot dressing was just as strongly indicated and the marked deformities here shown in all probability, would not have occurred; moreover, the patient would have enjoyed the advantages of quick healing and comfortable convalescence.

DR. HAYS said that the case illustrated what sort of action one may get from iodoform. Dr. Davis and he agreed on what one of them called blood-clot dressing and the other called primary closure of the wound, and the two had often discussed the matter. He himself preferred whenever possible to close the mastoid wound, and he did so in the majority of cases. His personal experience was that when one has so large a cavity as this patient had it was almost impossible to bridge the gap, and if it was sutured the sutures were very likely to break down, for a great deal of tension had to be applied. As a rule, he did not believe in packing, but in this case it was necessary, but if it was necessary to use gauze, the paraffinized gauze would give a very much better result than the ordinary kind. He was very loath to use iodoform gauze in any instance.

Otitic Meningitis (Serous) Following Acute Otitis Media and Mastoiditis; Mastoidectomy; Recovery. Dr. James Joseph King, New York.

S. L., a boy of six years, was admitted to the New York Eye and Ear Infirmary, service of Dr. Robert Lewis, to whom I am indebted for the pirvilege of this report, on the 28th of February, 1922, with the following history:

He was normal in health until five weeks ago, when he developed chicken pox, which was followed by mumps, and then measles. The left ear began to ache one week previous to admission to the hospital. The family physician was called and performed a paracentesis of the left

membrana tympani. Following the incision small quantities of pus were discharged at various intervals. Hearing not impaired. Fever and headache for one week. No other symptoms.

Physical examination on admission: Temperature 104.4°, respirations 30, pulse 128. An anemic child, six years old, very ill in appearance, very restless and irritable, stiff neck, general hyperesthesia, has diminished knee jerks, positive Kernig on both sides, Oppenheim and Gordon suggestive, no Babinski present. The right ear and mastoid normal in appearance. The left mastoid swollen and tender throughout, canal full of thick, creamy pus, marked sagging of posterior superior wall. Drum reddened and bulging, pulsates through opening in drum membrane superiorly. Some secretion and slight obstruction in nose. Tonsils moderate in size, but infected. Tongue coated and dry. Heart, lungs, and kidneys negative.

Report of Dr. Dixon on the radiographs of the mastoids is as follows: "Has small clear right mastoid, sinus forward. Left exceedingly cloudy, pneumatic, most all detail lost. Bone looks soft. Sinus in good position."

Bacteriological report showed a streptococcus infection, the type of which is not recorded.

Report of spinal fluid on March 1: Clear, Fehling's positive, globulin positive, cell count 230. Culture is negative for bacteria after 24 hours' incubation. Blood culture also negative.

On this evidence a diagnosis was made of acute mastoiditis, left, with serous meningitis of otitic origin. Following the usual preparation a simple mastoid operation was performed by me on March 1, 1922. The cortex was fairly thin, revealing free pus and extensive granulations of hemorrhagic type underneath. The emissary vein was exposed on the cortex posteriorly. The antrum, not very deeply situated, was widely opened. The sinus was in good position with extensive perisinus involvement in a fairly large mastoid cavity. A posterior incision according to Whiting was made. A large area of dura was exposed in the middle fossa showing slight injection of membrane and small petechiae. Dura was exposed by disease in the zygomatic region and there were granulations in this region. A very large area of dura was exposed in the region of zygoma and middle fossa, extending widely beyond the area injected and covered with granulations. The horizontal incision was closed with metal clamps, but the posterior auricular wound was left wide open. A Dakin's tube was sutured in and the wound dressed in the usual manner for the Dakin technique.

The temperature at time of operation was 105.6°. The child had the appearance of being very sick. The stiff neck, Kernig sign, and granulations and injection of the dura found at operation, lead us to believe that we were dealing with a serous or circumscribed meningitis, and that the child's life was saved by an early and complete operation.

The following notes were made: The blood count on March 1 showed red cells 4,000,000, white cells 21,300, small lymphocytes 17, large lymphocytes 1.5, polynuclears 81. On March 10 blood examination showed red 4,250,000, white 27,000, small lymphocytes 22, large lymphocytes 4, polynuclears 74. On March 21: Hemoglobin 80, red 4,000,000, white 5,200, small lymphocytes 40, large lymphocytes 2. Polynuclears 58.

The culture made at operation from the wound showed a mixed infection, including streptococci.

The daily examination of spinal fluid was as follows:

March 1. Spinal fluid clear, Fehling's positive, globulin positive, with 230 cells. The culture was negative for bacteria after 24 hours' growth. The blood culture was also negative at this time after 24 hours' growth.

March 2. One day after operation. Spinal fluid clear, globulin negative, Fehling's positive, with a count of 60 cells. Culture negative for bacteria after 24 hours.

March 3. Spinal fluid clear, Fehling's positive, globulin negative, cell count 20. Culture negative after 24 hours.

March 4. Spinal fluid clear, Fehling's positive, globulin negative, with a count of 14 cells, differential of which shows 50 per cent polynuclear

and 50 per cent mononuclear. Culture negative for bacteria after 24 hours.

March 5. Spinal fluid clear, Fehling's positive, globulin positive, cell count zero. Culture negative after 24 hours.

March 6. Spinal fluid clear, Fehling's positive, globulin positive, cells 12. Culture negative after 24 hours.

March 22. Blood culture negative after 24 hours.

Eye grounds negative at all examinations.

Temperature after operation receded from 105.4° to 103.4° with a slight elevation in the night to 104°. From that it gradually came down to 101 on the third day. On the night of the fifth day the temperature rose again, however, to 105°.

On March 10 he complained of pain in his right foot and leg and on March 11 I made the following notes: "Pain in right leg at knee. It is contracted, and boy complains of pain when it is extended." Dr. Lewis examined him with me and he was suspicious of a beginning psoas abscess. On the 11th we asked Dr. Eugene Poole to see him and he made the following notes: "Abdomen seems negative, flexion of hip and tenderness around hip suggests metastatic abscess, likely in the joint." He suggested X-ray and watching for definite evidence which would demand an incision. We watched him as directed by Dr. Poole and no abscess developed and I think we were justified in believing that this manifestation was just an evidence of sepsis manifested in this part from the original focus in the head. This gradually disappeared as general improvement advanced.

The posterior wound which had been left wide open was very slow in healing. On the 14th of March the ear canal was dry and the Dakin tube was removed. The wound was filled with excessive granulations. On the 23rd we decided to take him to the operating room, curette the granulations, and make an attempt to close the posterior wound, and to remove the tonsils and adenoids. I curetted the wound and made an attempt to close the wound with silk-worm gut sutures. There was such a profuse hemorrhage at this time that I decided not to remove the tonsils and adenoids. The sutures did not hold, but the wound seemed to improve after this. On the 30th of March he was again taken to the operating room and the tonsils and adenoids were removed, and another attempt was made to close the posterior wound. This was not entirely satisfactory, but from this time on he continued to improve until the wound was well closed and epidermitized entirely.

It was deemed advisable to remove the tonsils and adenoids at this time because of the generally septic appearance of the child and its manifestation as the pains in the leg, etc.

He was discharged from the hospital on April 6. The wound soon became completely healed following a few dressings in the dispensary.

It was my pleasure to report before this Section a similar case on February 10, 1922. This was an adult with less marked ear and meningeal symptoms. His spinal fluid, however, showed 1,000 cells to the count. He also made a complete recovery following a simple mastoid operation and large exposure of dura in the middle fossa, as has been recommended by Dench.

CONCLUSIONS.

1. Serous or circumscribed otitic meningitis is an early stage of septic meningitis.

2. The early removal of the focus of infection in the ear by mastoidectomy with large exposure of dura offers the only hope for saving the patient's life.

DISCUSSION.

DR. HAYS said that these cases of possible meningitis in connection with acute mastoditis were very interesting, and sometimes very baffling, and cited a case of acute mastoid with every symptom of meningitis. The patient was taken to the hospital and the mastoid was exposed, and later made an uneventful recovery. Apparently all the symptoms were due to an erosion of bone, and disappeared immediately after free ex-

posure of the dura and discharge of pus. Whether such cases are really cases of serous meningitis it is difficult to say. A year ago he reported a case of double mastoid. The wound did not heal on one side and a second operation had to be performed. On the second day the temperature jumped to 106°, with every symptom of meningitis. A lumbar puncture was done, revealing fluid under pressure, a cell count of 2200 lymphocytes was found, and a hopeless prognosis was made; the culture of the spinal fluid had not been received up to that time. After the consultant had left the mother asked if she could get in a Christian Scientist, and was told it made no difference what she did. The following day the child was sitting up in bed, and later left the hospital perfectly well.

Another class of cases have a relation to this:—cases of children who have had acute middle ear symptoms, but whose ear drums were never opened. Suddenly some weeks later they developed symptoms of meningitis. In two such instances the mastoids were opened and found in fairly good condition with a little serous fluid in the antrum, and both children died. In other cases where there has been little or no discharge from the ear and where the mastoid symptoms have been very much obscured, it has been difficult to decide whether or not to operate, for one would hesitate to say that an operation had better be done for fear a meningitis might develop; yet such cases as this of Dr. King's made one think very seriously.

Dr. Herzig congratulated Dr. King on the successful outcome of his case. The point that impressed him was the repeated spinal punctures, which doubtless had a great deal to do with the clearing up of the spinal count and meningitic symptoms. In his opinion resort should be more frequently made to that procedure in meningitis.

Dr. Kopetsky said that the case which Dr. King presented with a distinct pathological finding in the middle ear and distinct foci was one thing; with the case reversed, such a case as Dr. Hays spoke of, with very little findings in the middle ear and very little serum, and the condition so slight that the middle ear was not even opened, it was a very different thing. Here were two pictures; in the one, a prodromal period and then a meningitis; in the other, a distinct lesion in the ear, the condition in the middle ear advancing and by contiguity involving the dura, and seen by the surgeon when the granulations were present on the dura. We all regard granulations such as these as protective in nature. One has every reason to expect recovery in such a type of case; and very little reason to expect recovery in Dr. Hays' case, for there nature made no effort to protect. That seemed to be the explanation. This comparison was not made in any spirit of detraction in regard to Dr. King's case, but was made to call attention to the varying types of cases discussed.

Dr. King said that there was a very definite pathology in the middle ear, a perisinous involvement, and exposure of the dura by disease, with granulations on it; and the indications were clear for what was done. Dr. Lewis was consulted and agreed thoroughly in what was done. The spinal puncture helped greatly in the case; there were six spinal punctures in this instance; the other case had not so many, but he got well just the same.

Successful Blood Clot Dressing Secondary to Unsuccessful Carel-Dakin Dressing in Double Mastoidectomy. Dr. George E. Davis.

'E. F. G., age 11 months.' Referred to me April 19, 1922.

History:—Seven weeks previously developed cold and was treated by a pediatrist. During this period patient ran temperature varying from 101° to 106° F. and the case was diagnosed as pneumonia. One week before I saw the patient she came under the care of a prominent otologist, who did a double mastoidectomy and instituted the Carrel-Dakin after treatment. Under this treatment the patient did not progress favorably, the temperature fluctuating between 102° to 104°, and at the end of a week consultants diagnosed pneumonia as a complication, alleging this as the cause of the continued fever. On this account the parents were advised that it would be necessary to transfer the patient to another hospital—Bellevue. However, the parents took the patient home and called

their family physician, who, after a careful examination, stated that the lungs were not involved, but believed the condition of the ears were responsible for the hyperpyrexia, etc.

I saw the patient the following day, which was the sixth day subsequent to the original mastoidectomies. After removing the dressing and the tubes through which the Carrel-Dakin solution was applied, I thoroughly curetted both mastoid wounds—admitted the blood-clot on both sides and closed the wounds entirely. A single, sterile, thin gauze strip was inserted in the auditory canal on either side and a light sterile gauze dressing adjusted over all. The outer gauze dressings and gauze canal drains were changed daily. Succeeding the blood-clot dressing the fever dropped to about normal the following day and remained so without other treatment. In three days primary healing of the mastoid wound was complete on the left and in five days the same happy results on the right, with both canals dry and which have remained so.

Of course no general deductions can be made on a single case, but it is reported for what it is worth and as a confirmation of similar results obtained in a very great majority of cases where the blood-clot is employed primarily. Moreover, in the case reported the blood-clot dressing proved successful in the patient's home with a single nurse, whereas the Carrel-Dakin was a failure in a well regulated hospital.

DISCUSSION.

DR. HAYS said that he and Dr. Davis were very good friends and their discussions and controversies were merely over technical names, etc. He was much pleased that Dr. Davis had brought up this subject, for he had spoken of the non-success of the Carrel-Dakin solution. Since the war all of the men had used the Carrel-Dakin solution and Dichloramine-T, and many had come to the conclusion that the results from its use were often exaggerated. For many years he has closed mastoid wounds, excepting at the lower angle where he places a small strip of gauze, and examines the wound every day and expresses material from it; this material is usually sterile. Once or twice he had found it necessary to open the wound. One of these was a case of erysipelas, but he had never found a blood clot in the mastoid wound. One may have a clot at the close of an operation, but you get a fibrinous mass which does not fill the cavity completely, and it was difficult to see how it could be called a blood clot. His own idea was that a bridge of skin forms over the cavity which fills with granular tissue. In the cases which break down,—in children especially with lowered vitality,—there is probably a nasty slough, with granulations, etc., which are very difficult to overcome. Sometimes one does succeed in sterilizing the cavity with Carrel-Dakin solution through a tube, or with Dichloramin-T, but if you keep on using the antiseptics for a length of time, a severe reaction is created which interferes with the welfare of the patient Recently an eminent colleague stated that he had had a number of cases treated with Carrel-Dakin with marvelous results, but comparing these cases which have been partially closed with his cases they bear the comparison very well indeed. Dr. Hays feels that the healing process has been sufficiently rapid, wounds healing in from four to fifteen days, by emptying a primary suture and nothing more.

DR. GOTTLIEB said that at the New York Infirmary they had had a good deal of experience with the Carrel-Dakin solution, but the method would come to grief if the solution was not properly prepared. In this case presented by Dr. Davis, it was the preliminary treatment that produced the complete healing after he closed the wound: for in the first instance the wound had at least six days to go before Dr. Davis had the opportunity of operating, and during those six days a protective barrier was set up: after the injury of the operation had subsided the number of bacteria decreased, as in all wounds that have been drained, and it did not speak so much in favor of the blood clot method that Dr. Davis advocated as one would presuppose. Very often one would get with the Carrel-Dakin a breaking down of the edges of the wound, probably due to improperly prepared solution. He was sure that those who dressed the cases at the infirmary knew more about it than did the actual attendants,

and he hoped that either Dr. Shannon or Dr. Hogan would tell about their experience in using the solution in dressing mastoid wounds.

DR. C. W. SHANNON said that he had used the solution for two or three months under the best technique established at the infirmary. The first few cases had very poor results, but after the technique and solutions were thoroughly established the cases became very much improved and, as a rule, the results were very satisfactory; but, as Dr. Gottlieb said, the technique and operator make for success and all of these things together make it sometimes difficult to tell whether it is the solution that gives the result or not. The best result showed solid healing with dry canal and posterior wound in seven to ten days, while nearly all cases were discharged dry within two weeks. But, as in general surgery, the Carrel technique and Dakin's solution, both being so exacting, that its practicability became the main objection.

DR. HOGAN said he thought the children healed as well one way as the other, especially at the age of five or six years; an adult would usually be discharged in 12 days, and the others would be held much longer.

DR. KOPETZKY said that some years ago, when Sprague first brought out the blood clot treatment, and this was followed by Reik of Johns Hopkins, a wave of enthusiasm for this treatment of the post-operative wound spread over the country. Quite a series of cases were thus handled at the Manhattan Eye, Ear and Throat Hospital. Some of these cases did well and were discharged. Of the cases which he had operated and handled in this way, Dr. Kopetzky said that every single one of them eventually returned and required a secondary operation.

Dr. Kopetzky said that this was a clinical meeting where every one gave his own personal experience; but if one really wanted to compare different techniques, it should be done by the same man's using the different kinds of techniques upon similar types of cases. Then, only, would a proper judgment be rendered. Dr. Reik had opportunity to see, upon one occasion, some of Dr. Kopetzky's cases and then told him that such were not considered by him (Reik) as suitable for the employment of his method. In other words, it developed that the speaker and Dr. Reik were not using the method upon similar classes of cases. So if Dr. King or Dr. Davis or Dr. Hays got good results, and you do not, you must be quite sure that the cases submitted to the test of treatment were similar.

Anything that would shorten the after treatment in mastoid cases would prove of great value and was of interest. The Section was grateful to Dr. Davis for presenting this subject.

DR. MAYBAUM said that whatever criticism is to be directed at the method of healing mastoid wounds advocated by Dr. Davis, he is certainly to be congratulated upon the results obtained in the case he presented. Dr. Maybaum said that he had never been able to get away from the notion that the blood clot method offered, in most cases, an ideal medium for growth of bacteria in a mastoid wound. No matter how careful and thorough one may be in performing a mastoid operation, one surely can never completely sterilize the wound. The rationale of the method had never appealed to him.

He had used the Carrel-Dakin method in a number of instances, but it did not appeal to him. He knew of cases where its use had been followed by chronic discharging middle ears with large perforations. An advantage of the method is the comparative painless character of the dressings. The labyrinthectomy case presented this evening was dressed by Carrel-Dakin method. It was very satisfactory in this case. By the old method, the dressings would have been more painful and prolonged.

The last word has not been said on the subject of healing mastoid wounds. There is no question that Dr. Kopetzky is correct in the view he expresses of the many factors entering into the healing of a mastoid wound. A thorough operation is essential, no matter what method is used. The old method of gauze packing ought to be discarded; it is an admirable means of prolonging healing and continuing the infection. Almost closing the wound and using a rubber tissue strip is a far better method than packing with gauze.

DR. DOUGHERTY said he wished to say a word on the wisdom of discarding packing. The mastoid wound is nothing more or less than any other abscess cavity; and the general surgeons laugh at the way the otologists treat mastoid wounds as open wounds. The surgeon will remove a chain of glands from the neck, put in a rubber tissue drain, and sew up the incision; in a week, the case is discharged, healed.

He also wished to emphasize what the Chairman had said. He also was one of those who had religiously tried the blood-clot method of healing; he had always envied Dr. Davis in his results, but had never been able to obtain them himself. To his mind, there was always present the danger of making a perfect nidus of infection; no one is absolutely perfect, at all times, in the performance of a mastoid operation; the wound may be still slightly septic and the clot form a fine culture medium for the bacteria. Dr. Dougherty said he had tried the Carrel-Dakin method and would advocate it in certain cases. In those cases of sinus-thrombosis and jugular resection where there is an extensive infection in the surrounding tissues, there is nothing better, although it does sometimes macerate the edges and cause considerable irritation. Of late, he had been sewing up the mastoid wounds and placing a thin drain in the lower angle of the wound; if he had found it necessary to use anything in the line of the Carrel-Dakin dressing he had used Dichloramine-T in chlocozone, saturating the drain with the solution.

Dr. Davis was decidedly to be congratulated on the results he had gotten and it was no reflection on his work to say that in many cases it was not so much the personal equation of the operator as the personal equation of the case. That every case operated upon was not, in the strict sense of the word, an operable case, is the experience of every otologist; the question of operation has been a doubtful one and the patient has been given the benefit of the doubt. In these cases the wound is not septic and heals readily under any kind of treatment.

DR. DAVIS, closing the discussion, said that the case was reported for what it was worth and to contrast the blood-clot method with the Carrel-Dakin treatment following mastoidectomy, particularly in children, and he was pleased with the interest and liberal discussion elicited.

The after treatment of mastoidectomy is about twenty-five years behind the times. That statement was not meant as a reflection on any one, but as he had stated in previous discussions the subject was a very broad one and he is convinced that the profession will eventually realize its mistake in continuing antiquated methods, and that the advantages of the blood-clot method will finally force its acceptance.

One of the gentlemen raised the question whether the Carrel-Dakin treatment six days preceding the blood-clot dressing facilitated the healing. Perhaps so, but the time of healing in this case is not unique, though the blood-clot was secondary to the Carrel-Dakin treatment. Other cases have healed quite as readily, notably in the young, where the blood-clot was used primarily. Moreover, during the period of the Carrel-Dakin treatment in this case, the hyperpyrexia continued and the general condition was not good at all. These symptoms were regarded not due to the ear conditions, but to a complication diagnosed as pneumonia, and on this account the parents were requested to transfer the patient to another hospital or his home. With the substitution of the blood-clot method for the Carrel-Dakin treatment I am happy to report that all unfavorable symptoms promptly subsided and in a very few days both sides were completely healed, canals dry, and have remained so, notwithstanding the child has a mass of adenoids in the pharyngeal vault and hypertrophied tonsils.

Dr. Kopetzky, in his discussion of this case, has seen fit to make an invidious comparison of the diagnosis and character of the cases operated by himself and a distinguished confrere, which I must say I feel is altogether unfair and unjust. Not that Dr. Reik needs any one to champion his part, for his ability and authority as an author, teacher and surgeon is well known and his work compares favorably with the best. I am quite sure his statistics are based on authentic cases.

Dr. Kopetzky requested me in closing the discussion to report how long I had followed my cases treated by the blood-clot method and the percentage of secondary operations. For his information and to convince him that this technique is adapted to genuine mastoiditis (even with complications), I am pleased to cite a case reported six years ago, in a man about forty-five years of age, an alcoholic, syphilitic and general condition poor, one whom, at the Polyclinic Hospital, I did a left mastoidectomy complicated with a very extensive sub-periostal abscess, a perisinal abscess and sinus thrombosis, and after packing the wound five days with iodoform gauze, a blood-clot was admitted and the wound closed. Five days later the wound was healed save in the lower half inch, where there was a partial breaking down of the clot, but in five or six days more healing was complete and with very slight deformity. This man was well at the end of two years, when I lost touch with him, as he was a traveling actor. Certainly this case demonstrates that the blood-clot is suited to severe cases, not merely for mild or unauthentic ones. Moreover, the blood-clot technique, in my experience at least, does not require secondary operation more frequently than the older methods.

Dr. Dougherty's remarks in regard to the splendid manner in which general surgeons handle bone-abscess cases were apropos and I agree with him that our work, in comparison, for the most part in such cases, should make us ashamed of ourselves. Halstead, that master surgeon recently passed beyond, Oeschner and others have illumined the way if we but had the courage to follow!

Dr. Kopetsky expressed the hope that no one had interpreted his remarks as being in any way a criticism of Dr. Reik, for he had never questioned his ability as a conscientious diagnostician and surgeon, and had the deepest respect for him. It was simply because of his deep friendship for him that he had taken the liberty of citing his name as an example.

Double Mastoiditis Pneumonia and Sinus Thrombosis in Baby Fifteen Months Old. Dr. J. Morrisset Smith.

The complications occurring in the following case made it very difficult to decide just what course would offer the patient the best chance for recovery.

The baby was admitted to the hospital with a double mastoiditis, a simple mastoid operation was done on the left side, mastoid cells were broken down filled with free pus, no exposure of sinus or dura, usual dressing, incision was done on the right drum and the patient returned to bed.

The temperature gradually came down and progress seemed satisfactory. The right ear was discharging freely, but operation was not deemed necessary.

One week later temperature suddenly jumped from 100½° to 105 8/10°. A total white cell count showed 16,000 cells CnM.M., and blood culture showed in twenty-four hours fifteen colomis of hemolytic streptococci; the consulting internist reported a pneumonia right side. The problem here was very complex in lieu of the positive blood culture, double mastoid infection and the pneumonia.

The baby was taken to the operating room and right mastoid was thoroughly cleaned out, the lateral sinus was exposed and apparently normal. The left mastoid was then reopened, the lateral sinus exposed; there was no evidence of a complete clot, but there was a small dark looking spot on the sinus wall just below the knee. The sinus was completely uncovered from above the knee down to the bulb, then, due to pneumonia and time consumed by operation, the patient was returned to bed, deciding that it would be better to defer the sinus operation for a day or two. The next day the patient's temperature was 104 4/10°; a second blood culture was taken which was negative at the end of 24, 48 and 72 hours. Improvement continued, temperature came down and an uninterrupted recovery followed. The most plausible explanation would seem to be that the infection in the sinus was intramural and from this point the organ-

isms were released in the blood stream, giving a positive culture, following the removal of the bone over this area, the infection remained localized in the sinus wall and was able to take care of itself.

DISCUSSION.

DR. GOTTLIEB congratulated Dr. Smith on the results obtained in so serious a complication of conditions. Referring to the matter of determining which, if not both, sinuses are affected, he cited Dr. Kopetzky as telling him of a case of double mastoiditis in which he was thinking of the possibility of determining the number of bacteria in the blood coming from the internal jugular, but said he had never heard anything more of that particular method of determining the location of the infection. It would be very interesting to hear from Dr. Kopetzky on that point.

DR. MAYBAUM said that Dr. Smith was to be congratulated upon his good judgment and conservatism in this case. Young children do not stand jugular and sinus any too well; a complicating pneumonia makes the condition extremely dangerous and a poor operative risk.

Undoubtedly there are cases of sinus phlebitis without clot formation giving rise to sepsis, as in this case. A sinus phlebitis with clot formation sometimes takes care of itself because of the bactericidal properties of the blood.

Where both mastoids are involved and the question of which jugular to tie comes up—unless definite difference in the appearance of the sinuses is present—it is far better to do nothing. He cited a case seen at Manhattan Hospital some years ago—a case of Dr. Friesner—an adult with double mastoiditis—positive blood culture—septic temperature. Nothing definite could be determined by exposing both sinus plates. The man developing multiple abscesses in the muscles and subcutaneous tissue. After a very stormy course he recovered without jugular or sinus operation.

DR. KOPETZKY, replying to Dr. Gottlieb's question, said that a case of double mastoid and sinus thrombosis with a positive blood culture presented a very serious and pressing problem, but one which had to be faced at the bedside; and at the time to which the Doctor referred he had been working on that particular problem. In order to make the test, one must have a very expert hematologist and must with absolute precision take from both jugulars equal quantities of blood; then count the colonies growing on the blood taken from both sides and base the results on the conclusion obtained. On the side where the thrombosis is you should get more colonies than from the opposite side. The logic of the matter was open to many fallacies, however,—the fact that bacteria grow in the blood stream of a case is going bad is one, and secondary foci is another,—but the test offers one method of approaching a solution. It is not conclusive. There were other ways—listening to the blood stream bruit, etc. The best determination was to be found in the study of the original pathological lesion at operation; the side that presented the greatest amount of lesion, the greatest destruction, is the one where the sinus would be supposed to be involved.

Dr. Kopetzky said he did not wish to be understood as advocating this differential counting as a means of diagnosis.

DR. SMITH said that in this particular case at the primary operation there was no exposure of the sinus; but of course there was a double mastoid infection and this, together with a positive blood culture, made it difficult to decide what should be done. Had it not been that a pneumonia also was present, he would have ligated the sinus and cleaned out the jugular, but there was no doubt that if you were to ligate both jugulars the patient would die. In this case, after the sinus was exposed, a dark spot was found on the wall, but no clot. Where you are confronted with a double mastoiditis and a positive blood culture, the best proceedure is to uncover the lateral sinuses, first one side and then the other, and you are very apt to determine by inspection and palpation the location of the lesion. When it comes to taking blood from the jugular, it must be remembered that you may have a completely clotted sinus and get no organisms in the culture, so that should the clinical symptoms of a sinus thrombosis continue this factor must not be overlooked.

BOOK REVIEWS

Brain Abscess. Its Surgical Pathology and Operative Technic. By Wells P. Eagleton, M. D., Newark, N. J., Lt.-Colonel, M. R. C.; President of the American Otological Society, 1921; Medical Director, Newark Eye and Ear Infirmary, Newark, N. J.; Chief of the Division of Head Surgery, Newark City Hospital; Attending Carniologist, Newark Presbyterian Hospital; Consulting Carniologist, St. Barnabas Hospital and St. Michael's Hospital, Newark, N. J., Muhlenberg Hospital, Plainfield, N. J., Mountainside Hospital, Montclair, N. J.; Chief of the Section of Surgery of Head, Base Hospital, Camp Dix, N. J., 1917-1918. New York, The MacMillan Company, 1922.

The opening sentence of the Foreword of this monumental treatise on Brain Abscess is characteristic of the author:—"This monograph is the result of considerable intradural experience, associated with many bitter disappointments and failures; some animal experimentation; and of observations during post-mortem examination of cases in which death had resulted from varied intracranial lesions. Recognizing that surgical as well as pathological diagnostic information is obtainable from post-mortems, a personal effort invariably has been made to obtain an autopsy on all cerebral cases coming under my observation."

Another quotation from the Foreword which explains the author's position in this work is:—"The surgeon must divest himself of certain ideas inherent in the old classification of aural and nasal origins and must conceive of them not according to their immediate origin, but pathologically, according to the causative lesion of entrance into the central nervous system; that is, whether extension is by direct tissue suppuration or by retrograde thrombo-phlebitis, for which the author suggests the term Adjacent (Secondary) and Intracurrent (Tertiary), when immediately occasioned by a secondary gross lesion such as sinus thrombosis, to differentiate both from abscesses originating from the deposit of infected bacterial virus circulating free in the blood stream, the latter being pathologically metastatic, even though the original focus of infection may be in the ear or the nose. One of the chief objects of this work is to enable the surgeon to apply a pathological nomenclature to the subject and thus approach the treatment of brain abscess in a pathological as well as a technical mental attitude."

The careful observations and broad experience of the author in more than fifty cases of adjacent brain abscess qualifies him to an unusual degree to present his subject-matter in an authoritative manner. There is perhaps no colleague in America who has had a wider experience in this class of work from the joint standpoint of the otologist and the operating brain surgeon, and the fundamental principles which he discusses clearly and minutely are sound and gleaned from this wide and actual experience should be of inestimable value for instruction, for guidance and for reference.

His subject-matter is divided into three main captions: I. General Considerations in Intracranial Surgery, including preparation, general surgical technic of intracranial operations; II. Surgical Pathology and Operative Technic of Brain Abscess, including pathological and surgical considerations, abscess of middle fossa, metastatic abscesses, cerebral abscess, frontal lobe abscess, hernia cerebri and an especially original chapter on protective mechanism of the brain; III. Surgcial Diagnosis, including Diagnosis of Brain Abscess in General, diagnosis of adjacent temporo-sphenoidal lobe abscess, cerebellar abscess, frontal lobe abscess, complications and results.

In the Appendix the author adds I, An Excellent Practical Guide for Detailed Neurological Examination; II, An Analysis of Pathological Con-

ditions in Reported Autopsies of One Hundred and Twenty-five Cases of Cerebellar Abscess, including Detailed Post-Mortem Findings; III, An Analysis of One Hundred and Forty Reported Cases of Frontal Lobe Abscess.

These analyses include not only a very complete bibliography of all authors reporting in this field, but a sufficiently comprehensive report of every case coming under observation and forms, in the opinion of the reviewer, a most classic reference to the entire field.

I have termed this a monumental effort and I would add that it is perhaps the best and most complete monograph on Brain Abscess published in the English language and Dr. Eagleton deserves the congratulations of the entire otological profession for placing at their disposal this valuable, practical guide to an important and serious phase of otology. The book cannot be minutely reviewed; it must be deliberately read and absorbed.

Oto-Rhino-Laryngology for the Student and Practitioner. By Dr. Georges Laurens. Authorized English Translation of the Fourth Revised French Edition by H. Clayton Fox, F. R. C. S. (Irel.) With a Foreword by Sir J. Dundas-Grant, M. A., M. D., F. R. C. S. The Second English Edition with 589 Illustrations. William Wood and Co., New York, 1922.

This little book, designed as it is for the doctor who, though not a specialist in this field, is often called upon to diagnose and treat diseases of the ear, nose and throat, is a most valuable and concise treatise. It is written in plain language and avoids most of the ultra-technical terminology.

The information needed by the practitioner in this work is given in detail, including the armamentarium and a careful explanation of the technic of examination and diagnosis of the various disease conditions in this special field. Operative technic is for the most part omitted, as it is expected that serious cases will be referred to the specialist for such procedures. Many diagrams and sketches are given to enable the reader to thoroughly illuminate the deeper parts of the ear, nose and larynx and to aid the practitioner who is probably only theoretically familiar with these structures to meet, diagnose and treat the more common ailments to which they are heir. Mistakes and errors which the beginner is apt to make are pointed out and explained in order that they may be avoided.

It is on the whole a most valuable little reference work and should be in the library of every practitioner who is occasionally called upon to enter the field of oto-laryngology.

Bronchoscopy and Esophagoscopy. A Manual of Peroral Endoscopy and Laryngeal Surgery. By Chevalier Jackson, M.D., F.A.C.S. Professor of Laryngology, Jefferson Medical College, Philadelphia; Professor of Bronchoscopy and Esophagoscopy, Graduate School of Medicine, University of Pennsylvania; Member of the American Laryngological Association; Member of the Laryngological, Rhinological and Otological Society; Member of the American Academy of Ophthalmology and Oto-Laryngology; Member of the American Bronchoscopic Society; Member of the American Philosophical Society, etc., etc. With 114 illustrations and Four Color Plates. W. B. Saunders Company, Philadelphia and London, 1922.

When THE LARYNGOSCOPE had the honor to publish for Dr. Jackson his incomparable work, "Peroral Endoscopy and Laryngeal Surgery," we thought the last word had been said by this master of an unusual field. Today we greet a new volume by him on Bronchoscopy and Esophagoscopy which, as the author states, is based on an abstract of the larger work. This abstract was prepared to get the reader's point of view and presents the purely manual endoscopic procedures.

In a field in which technical expertness is so large a desideratum a detailed consideration of the practice of endoscopy, tersely presented,

well illustrated and stripped of all etiological, symptomatological and pathological considerations should be a very acceptable working manual for every man engaged in this special work when presented by the Master.

It crystallizes the practical experience of many years of painstaking labor, of careful observation and of unusual ingenuity, together with a masterly skill, both innate and acquired. No colleague engaged in Endoscopy can afford to be without this practical working guide; it is like the military manual to the soldier or the Quiz Compend to the medical student and, above all, it reflects the common sense and the working spirit of Jackson.

High Frequency Practice, for Practitioners and Students. By Burton Baker Grover, M. D., Author of Handbook of Electrotherapy; President of the Western Electrotherapeutic Association, 1919-1920; Fellow of the American Electrotherapeutic Association; Fellow of the American Medical Association; Member of the Medical Society of Missouri Valley; Colorado State Medical Society, etc. Illustrated with Ninety-five Engravings. Kansas City, The Electron Press, 1922.

This little book gives a very adequate presentation of the most modern methods of electrotherapy and is especially suitable for use by students in that it is written in language that any doctor can understand. The author follows a logical sequence of thought in his presentation of his subject in that he devotes his first chapter to a thorough discussion of the underlying principles governing this treatment and then leads logically from one phase of the work to another.

Separate chapters are devoted to important subjects, Pain, Blood Pressure and Diseases of the Eye in which the indications and contra-indications for Electrotherapy are clearly given and the technique of treatment explained in detail.

Although the reviewer cannot pass judgment on all the theories presented, he recommends this book to those who are interested in this special type of work. A. M. A.

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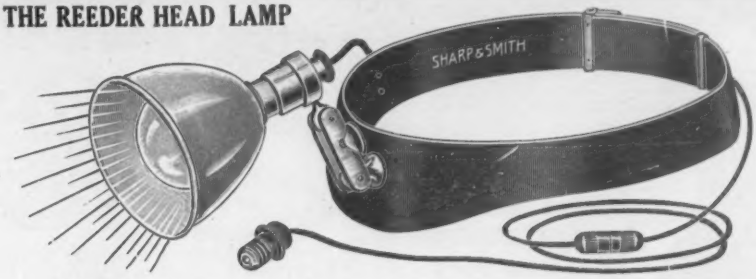

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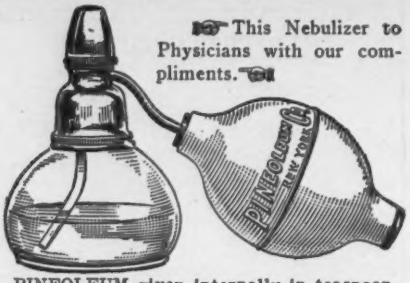

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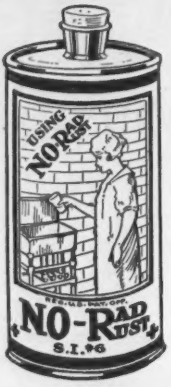

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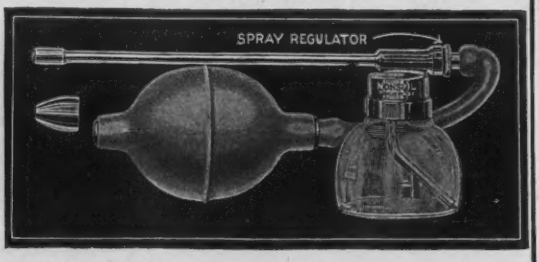

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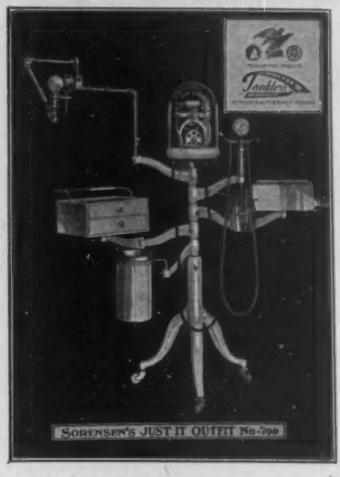

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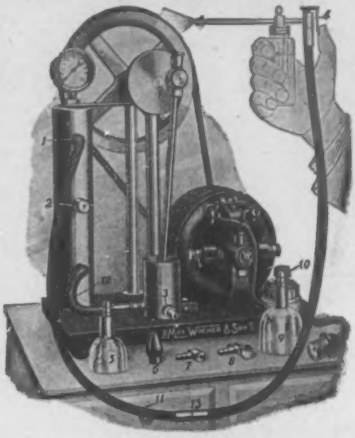

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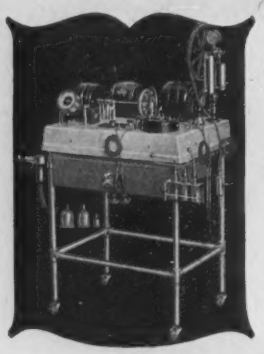

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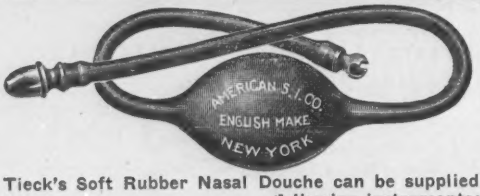

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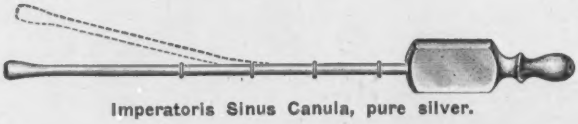

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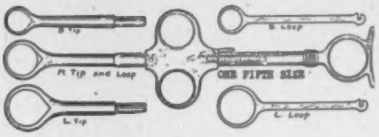

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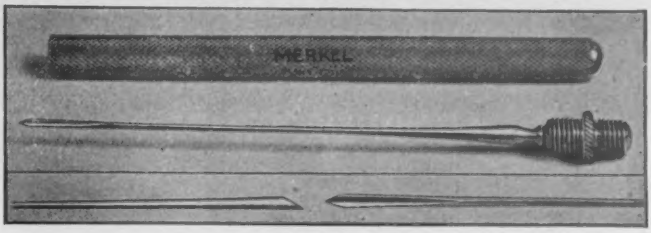

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The value of Glykeron is attested by the universal use made of it by members of the medical profession.

COUGH.

Whether acute or chronic, cough is promptly allayed by Glykeron. Irritability of the respiratory mucous membrane is diminished. bronchial secretion is increased and inflammation is reduced. The preparation is particularly useful in dry, hacking and unproductive cough or that attended with pain, respiratory distress or restlessness.

BRONCHITIS.

In acute bronchitis, Glykeron proves notably serviceable. It tends to diminish the congestion and inflammation of the respiratory mucous membrane, and to allay pain, dyspnea and other distressing symptoms. In chronic bronchitis, its sedative effect renders it of distinct value.

PHTHISIS.

Glykeron is indicated in many cases of phthisis, because of the promptness with which it allays restlessness, irritability of the pulmonary mucous membrane and the discomfort caused by efforts to expel secretions from the air-passages.

ASTHMA.

Glykeron diminishes the intensity of asthmatic paroxysms and lengthens the intervals between their recurrence. By the systematic administration of the preparation, asthmatic attacks can be lessened in severity and often aborted.

PNEUMONIA.

In the initial stage of pneumonia, the preparation exerts a helpful sedative influence. In the latter stages of the disease, its anodyne effect proves helpful..

WHOOPING-COUGH.

When administered in doses appropriate to the age of the patient, Glykeron lessens the spasmodic character and the frequency of the paroxysms and thus adds to the physical and mental comfort.

DOSAGE.

The adult dose of Glykeron is one teaspoonful every two or three hours, or at longer intervals as the individual case requires. For children of ten years or more, the dose is from one-quarter to one-half teaspoonful; for children of three years or more, five to ten drops.

GLYKERON is designed solely for use on order of physicians.

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